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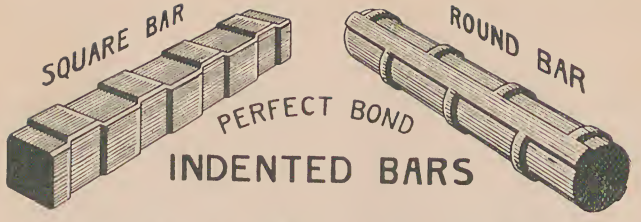

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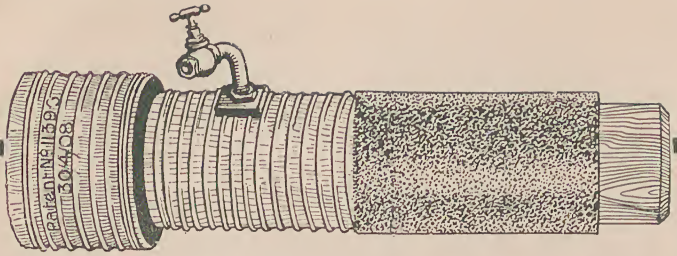

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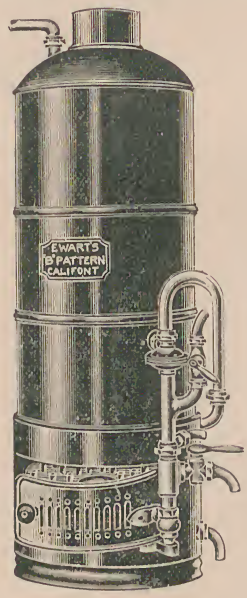

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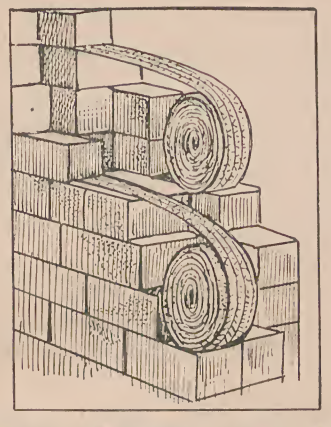

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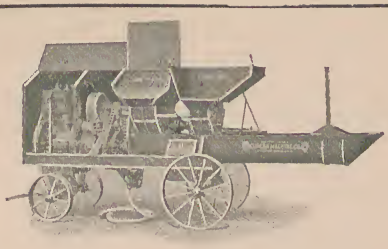

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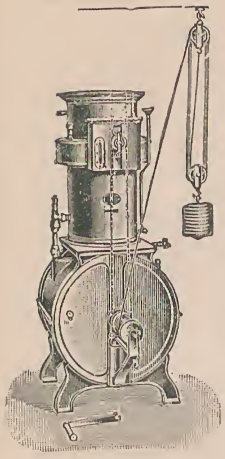

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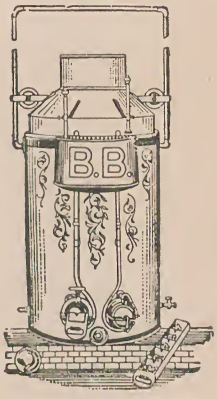

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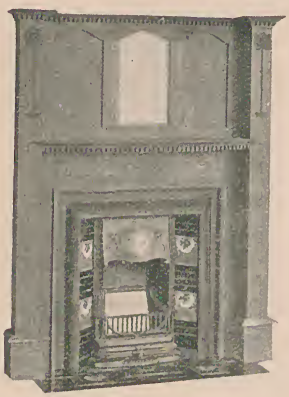

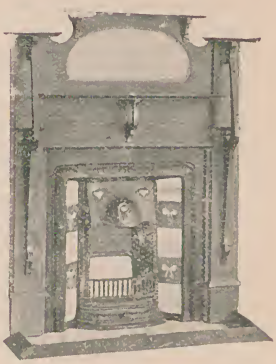

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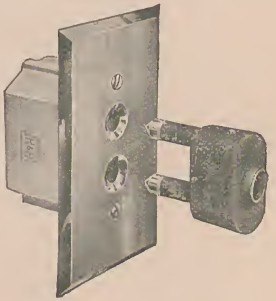

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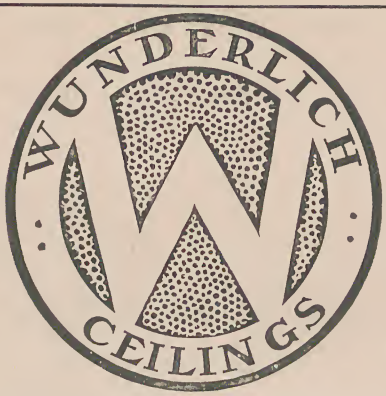

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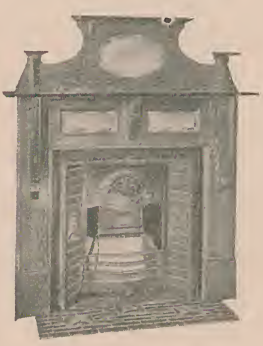

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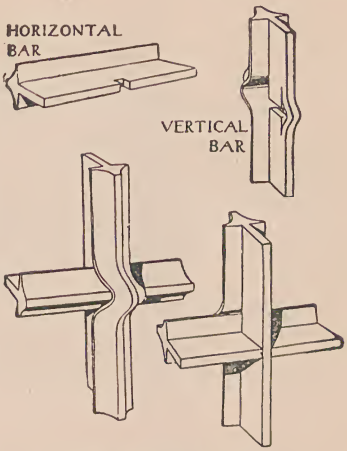

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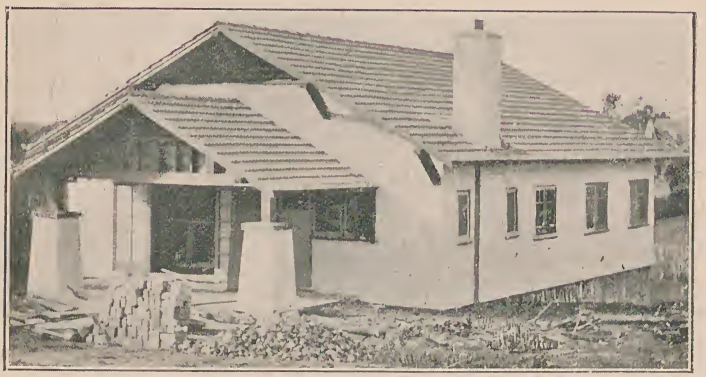

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PREFACE.

In preparing this, the eighth edition of "Mayes' Builders and Contractors Price Book," I have carefully studied the convenience of my readers in affording facility for quick reference to all information by alphabetical arrangement of subjects and also by index and illustrations. The sets of new tables, carefully worked out and checked, will also save time in estimating.

The prices for materials will be found correct at the time of publication, but are liable to fluctuation by the inevitable law of supply and demand.

The prices of labour are reckoned at the current rate of wages stated under each trade. **If wages or materials alter in prices add or deduct.**

The prices of plant and tools used by various contractors, as well as those in the building trade, will be a useful reference ; also the illustrations will help considerably.

Legal notes relating to Australian Contracts, employers, architects' agreements, and building generally, written expressly for this work, will, I feel sure, be found useful to my readers.

The summary of prices under different trade headings, calculated on the current rates of labour and material, are given as a guide only.

Fixed prices with similar profit adapted to all circumstances are impossibilities.

The **cost** prices under favourable circumstances are therefore given, leaving to the contractor to add what he considers a fair allowance for incidental expenses and for profit as the locality and circumstances warrant.

Any reference made to names of agents, manufacturers, or brands is only for the convenience of contractors, and not **intended to advertise any particular kind or description** of building material or contractors' plant.

In this enlarged edition I have not given detailed prices for timber and mill joinery, as the timber merchants publish **monthly lists.**

The **chief** value of a price book is as a book of **reference.** where the average or standard prices obtainable can be ascertained and is thus both a guide to and also a check upon contractors' own current prices and methods.

In revising this work the most reliable standard authorities have been consulted, and every means has been taken to secure accuracy.

The Author will be pleased if his readers will make any suggestions which are considered of importance to the Building Trade, to be incorporated in a future edition, as it is desired that the work shall be as useful and complete as possible for the benefit of those for whom it is published.

In conclusion, I have to thank those who have rendered me valuable assistance in preparing this work.

C. ERNEST MAYES.

Neutral Bay,
Sydney, 1914.

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QUANTITIES & MEASUREMENTS.

In addition to the rules for measurements given under the various trades, the following mems. will be found useful

Adhere as much as possible to one system and routine of measurement, following the order pursued by the builder, &c., in actual construction.

In taking dimensions, it will be found most convenient to work from left to right, especially when making sketch plans with dimensions.

In excavations, foundations, or walls of a building, take the back and front and parallel walls from out to out, and the other walls in the clear.

In scaling from a plan, when the dimensions are not given. apply the reading of the scale at the end of the first dimension to the commencement of the second dimension ; repeating the operation until the scale is exhausted or the end of the scale is reached ; note these accumulated dimensions, and repeat the process until the whole of the walls required are measured.

The measurement of the length of foundation walls will be a check on the measurement of the walls forming the superstructure. These lengths can be taken for the trenches in excavation, allowing about 12 inches in the widths to enable the masons, &c., to strike the joints. As the excavation, levelling and stepping of trenches, with part refilled and rammed, are worth double or treble ordinary excavation, they must be kept separate.

Rock excavation should be reckoned by the cube yard with the stepping and levelling by the foot super.

Chimney breasts, including fireplaces, are generally reckoned solid, allow for arch separately, when the fireplace opening is deducted.

Cornices, strings, &c., are reckoned solid, the length, breadth and depth being taken.

Ovens, coppers and furnaces are reckoned solid by the cube yard.

Facings, pointing, &c., by the yard super or square of 100 sup. feet.

Gauged arches, cuttings, &c., by the foot super.

Openings.—The width is always given first and then the height; **daylight,** or the size of opening in wall being intended. If the head is curved, the height from the stone or brick sill to the centre of soffit is implied, unless stated otherwise.

Flooring may include joists, at per square, or the joists may be taken at per hundred lineal feet, stating the scantling; or per 100 sup. feet, one inch thick. If the flooring is taken net, it will form with the hearths and chimney breasts a check for the plastering or lining of ceilings, after deducting well-holes of stairs, &c. If the net measurement is taken for flooring, an addition must be made to the price to allow for loss of width by tongueing and grooving, besides short lengths and remnants too short to work in. This, with 6 x 1 T. and G. flooring, would be about ten per cent.

Chimney breasts or flues are not deducted in measuring ceilings.

The lineal measurement of facia next eaves will also give the length of eaves for slating, and the length of eaves spouting, with one foot added for each angle. The soffit, if more than 11in. wide, should be reckoned by the foot super.

Bracketing, per super foot.—Take lengths of walls by the girth of brackets.

Ribbed and other centreing, per foot super.

Joinery is reckoned by the foot super, or lineal foot, as given under the various headings.

Builders' prices are usually made up of material, labor, cartage, scaffolding, waste and profit.

The cost of each varies from time to time, the site and weather have to be considered, so there could not possibly be fixed prices; add 5 per cent. for established charges; 5 per cent. depreciation of plant; 10 per cent. profit for small jobs up to £1000.

All kinds of work, if done in small quantities, are worth from 25 to 50 per cent. more than that in large areas and quantities. Also, the smaller the area and more confined the space for workmen, and cramped handling of materials are important items governing cost.

Buildings of two or more storeys are cheaper than cottages on the one plane, as the cost of foundation and roof is distributed.

Another contractor's method to save labor in estimating is to concentrate measurements of buildings into as few items as possible, making a schedule of grouped prices for different qualities of the work, allowing for the usual openings.

Walls of brickwork, including plastering, skirting, etc., external and internal walls, at per 100 square feet.

Flooring, including joists, plates, different kinds of scantling, at per square.

Roofing material, including rafters, timbers, and scantling, at per square.

Ceilings, including joists, at per square; cornices and picture rail can be added after.

Verandahs, including paving, plates, posts, woodwork, per foot run, according to width.

Foundations, bay windows, porches, reckoned according to detail.

Usual door and window openings, including architraves, complete, fitted with ordinary doors, furniture, glazing, at per opening, or superficial foot. This method is also approximate, and requires judgment in its application.

COST OF BUILDING BY CUBING.

This may be approximately arrived at by the method of cubing and is only a comparative price, arrived at by comparing with other similar work.

Reliance must only be placed upon the tedious, but exact method of taking out quantities and pricing in detail every item specified.

Measure average outside length by breadth, and multiply by average height; add all extras.

Balconies, Verandahs and Out-offices and Projections taken, measured, and classed by themselves. Judgment and experience is indispensable.

The cubed prices worked out from accepted tenders in Sydney and N.S.W., from 1908 to 1914 were about:—

Mansions, two storey, first-class finish, from	−/8	to	1/−
Public Office buildings, stone	1/−	,,	1/6
Schools, Gaols, plain brick or concrete ...	/−6½	,,	−/7½
First-class city Shops	−/8	,,	−/10
Church, brick and slate roof (country—Inverell)	−/6	,,	−/7
Villa Residences, second-class, and Bungalows	−/6	,,	−/8
Modern Cottages, tiled roof, and third-class	−/5	,,	−/6
Plain Spacious Stores, city	−/4	,,	−/6
Weatherboard Cottages	−/4	,,	−/5
Brick Out-offices of Resid nces	−/3½	,,	−/6½
Residential Flats, first-class, Villas, one storey...	1/−	,,	1/3

(The above to be used only as a check in case of faulty tendering).

GENERAL DEDUCTIONS ON COST.

The carcass of a building costs about 2/3rds. of the work finished.

For forming site (re-forming roads cut up), fences, drainage and water supply, add about 8 per cent. on to cost of ordinary house or cottage.

Brick buildings cost 10 to 20 per cent. less than stone ones.

Wooden buildings 30 to 50 per cent. less than stone.

Concrete blocks, 20 to 35 per cent. less than stone.

The Repairs or upkeep of a dw lling building: After the first year reckon 1 per cent. on prime cost; after the tenth year, 2 to 5 per cent. of cost.

Standard prices of materials and labor are given throughout. If any increase or decrease occur at any time, ascertain the percentage and add or deduct.

WEIGHT OF BUILDING MATERIALS.

Stone, &c. — *Australian*	Per cubic foot lbs.	Cubic feet per ton
Oamaru, Typo, Waurn Ponds and Geelong freestones	134	16½
Kyneton sandstone	138	16¼
Western Port do. ...	148	15½
Spring Bay ditto ...	140	16
Pt. Ventenet do. ...	145	15½
Grampian sandstone	...	14½
Sydney sandstone ...	140	16
Bluestone (basalt) ...	161	14
Granite, grey or red	167	13½
Marble, Adelaide ...	169	13¼
Rubble ballast and metal, see page 37		
Brickwork, see page 43, dry about ...	124	18
Sand (sharp), about	95	23
Clay, mild brick earth ...	120	17
,, strong and stiff...	135	16½
Mortar, dry ...	93	24
English, etc.		
Bath (Oolite) ...	140	16⅓
Portland, do. ...	153	14⅔
Craigleith sandstone	149	15
Caen, French freestone	132	16½
Granite, Aberdeen	116	13⅔
Marble, Carrara ...	170	13¼
Cast Iron	464	4.83
Wrought Iron ...	477	4.70
Concrete Material.		
Cement, Portland ..	87	26
Cinders, clean ..	60	37
Coke, ordinary ..	46	49
Coke, breeze ..	37	60½

Timber. — *British, etc.*	Per cubic foot lbs.	Cubic feet per ton
Red or White American pine (seasoned)	34	66
Yellow pine, Baltic (seasoned) ...	35	64
Red pine, Riga ditto	33	62
Pitch pine (seasoned)	39	57½
Cedar, Spanish American (seasoned)	30	75
Mahogany, Spanish	66	34
Mahogany, Honduras or Baywood ...	40	56
Oak, just felled ...	68	33
Oak, of commerce ...	57½	39
Oak, well seasoned...	48	47
Elm, just felled ...	58	38
Elm, well seasoned...	42	53
Teak, Indian, do. ...	42	53
Ebony	80	28
Australian.		
Cedar, N.S.W. market cut	36	62
Kauri Pine, New Zealand, market cut	40	56
Hardwood, market cut, about ...	56	40
Iron bark and box, just felled ...	70	32
Blue or red gum ditto	65	34½
Stringy bark and Blackwood, do. ...	64	35
Jarrah	51	44
Maple, American ..	47	48
Maple, Queensland	48	47
Walnut, black ..	60	37
Walnut, Tasmanian	56	40

See also Index.

WEIGHT OF BUILDING MATERIALS.

Roofing, *per square.*	cwt.
Slates, 4in. lap	6
Palings, half, 5 or 6 ft.	3 to 4
Shingles	2½ to 3
Zinc, plain, 8 to 12 gauge	⅝ to 1¼
Gal. Corrugated Iron, 26 and 24 gauges lapped 2 corrugations ...	1 to 1½

Lead—add 00 to the lbs. per foot for the lbs. per square (multiply by 100) and allow for laps.

The rolls are generally about 30 feet by 7 feet.

Floors, *per square.*	cwt.
1in. wrought American red or white pine ...	2
1⅛in. wrought Baltic red pine	2 1-3
1in. ditto, pitch pine ...	2⅛
1in. Colonial Pine, T. & G.	2½
Ditto, hardwood, dressed	4

Floors should be made strong enough to bear the following weights per foot sup. The scantlings may be calculated from the Tables of hardwood, etc. See Index.

	cwt.
Private or ordinary rooms, etc. ... from	1 to 2
Public rooms for meetings, halls, theatres, etc.	2½

Cement and Concrete Aggregates, *average.*	lbs. per cubic ft.
Coke, breeze	80
Clinker	100
Brick, broken	120
Sandstone, broken ..	140
Bluestone basalt ..	160

	cwt.
Warehouses or stores, railway or wharf platforms or landings, road bridges or railways over bridges ...	3
Railway bridges or viaducts	5

Sundries.	
Laths, split hardwood or sawn pine, 4ft. p. M.	2 to 2½
Posts and Rails, viz., 25 posts and 75 rails, market cut ...	30 to 35
Palings, 5ft. per C. ...	3 to 4½
,, 6 do. do. from ...	4 to 6
Shingles, hardwood, p. M.	3

Metals, *per cubic inch.*	lbs.
Iron bar	0.279
Iron or tin, cast ...	0.263
Steel, hard	0.283
Lead	0.411
Copper, cast	0.318
Brass, cast	0.304
Zinc, cast	0.26
Gun metal	0.31

Lime, Cement, &c.	lbs.
Lime, heads, p. bag, 3 bus.	180
Do. Geelong roche do.	200
Cement, Portland, p. cask of 3½ bushels ...	400
Plaster of Paris, p. ck. 3½ bushels	310

Bricks, *per cubic foot.*	
Melbourne, white or red	131
Ditto, white pressed ...	136

See also Index.

N.S.W. RAILWAY TRUCK CAPACITY.

Shewing Concessions.

Truck.	Capacity.		Lengths not exceeding.	Average Weight.	Concession
	Oregon or Kauri.	Hardwood.			
	Super.	Super.			
D. 6 ton ..	3,200ft	1,600ft	24ft	4 tons	No Conces'n
D. 8 ton ..	4,800ft	2,400ft	24ft	6 ,,	
E. Set ..	6,400ft	3,200ft	28ft	8 ,,	10 per cent.
F. Set ..	14,400ft	7,200ft	28ft	18 ,,	reduction
G. Set ..	9,600ft	4,800ft	27ft	12 ,,	on usual
M. Set ..	14,400ft	7,200ft	34ft	18 ,,	rates.

APPROXIMATE WEIGHT OF TIMBER, &c.

Per Ton Weight.

Hardwood ..	360ft. super.	Cedar ..	700ft. super.
Oregon	800ft. ,,	⅞ Baltic Flooring	1000ft. ,,
Kauri	750ft. ,,	¾ ,, Lining	1200ft. ,,
Redwood ..	600ft. ,,	½ ,, ,,	1600ft. ,,
5ft. Sawn H'dwood Palings,	350 count	Doors average	50 count
6ft. ,, ,, ,,	300 ,,	Stock Sashes, av.	100 pairs
Hardwood Pickets	500 ,,	Bricks, ordinary	333 ,,

WEIGHTS OF MATERIALS AND METALS.

Weight in lbs. of one Cubic foot.

Asphalte	155lbs.	Coke	41lbs.
Common Earth ..	95 to 125lbs.	Emery	250lbs.
Clay	125lbs.	Flint	164lbs.
Limestone	140lbs.	Glass (plate)	169lbs.
Coal (Solid)	80lbs.	Terra Cotta (Solid) ..	122lbs.
Coal (Loose)	52lbs.		

Metals.

Milled Lead	711.5lbs.	Wrought Iron ..	480lbs.
Cast Lead	709lbs.	Tin	460lbs.
Copper	539.6lbs.	Cast Iron	450lbs.
Sheet Copper	548lbs.	Zinc	440lbs.
Drawn Copper	555lbs.	Bronze	512lbs.
Brass (Drawn)	524lbs.	Bell Metal	545lbs.
Steel	494lbs.		

THE NATURAL ANGLE OF REST FOR MATERIAL EXCAVATED.

Dry Sand, Sheltered	22 degrees	Clay	45 degrees.
Wet Sand	38 ,,	Rubble or Mine Tips	45 ,,
Earth or Soil ..	30 ,,	River Shingle	40 ,,

CIRCUMFERENCES AND AREAS OF CIRCLES.

for either inches, feet, yards, links or chains

Di.	Circum.	Area.	Dia.	Circum.	Area.	Dia.	Circum.	Area.
			9	28.27	63.62	18	56 55	254.47
¼	0.785	.049	¼	29.06	67.20	¼	57.33	261.51
½	1.571	.196	½	29.84	70.88	½	58.12	268 80
¾	2.356	.442	¾	30 63	74.66	¾	58 91	276.12
1	3.142	.785	10	31.42	78.54	19	59 69	283.53
¼	3.927	1.227	¼	32.20	82.52	¼	60 47	291.04
½	4.712	1.767	½	32.99	86.59	½	61.26	298.65
¾	5.498	2.405	¾	33.77	90.76	¾	62 05	306.35
2	6.283	3 142	11	34.56	95.03	20	62.83	314.16
¼	7.069	3.976	¼	35.34	99.40	¼	63.62	322.06
½	7.854	4.909	½	36.13	103.87	½	64.40	330.06
¾	8.639	5.939	¾	36.91	108.43	¾	65.19	338.16
3	9.425	7.068	12	37.70	113.10	21	65.79	346.36
¼	10.210	8.296	¼	38.48	117.86	¼	66.76	354.66
½	10.995	9.621	½	39.27	122.72	½	67.54	363.05
¾	11.781	11.044	¾	40.05	127.68	¾	68,33	371.54
4	12.566	12.566	13	40.84	132.73	22	69.11	380.13
¼	13.351	14.186	¼	41 63	137.89	¼	69.90	388.82
½	14.137	15.904	½	42.41	143.14	½	70.69	397.61
¾	14.922	17.720	¾	43.20	148.49	¾	71.47	406.49
5	15.71	19 63	14	43.98	153.94	23	72.26	415.48
¼	16.49	21.65	¼	44.77	159 48	¼	73.04	424.56
½	17 28	23.76	½	45.55	165.13	½	73.83	433.73
¾	18 06	25.97	¾	46.34	170.87	¾	74.61	443.01
6	18.85	28.27	15	47.12	176.71	24	75 40	452 39
¼	19.63	30.68	¼	47.91	182.65	¼	76.18	461.86
½	20.42	33.18	½	48.69	188.69	½	76.97	471.44
¾	21.20	35.78	¾	49.48	194.83	¾	77.75	481.11
7	21.99	38.48	16	50.26	201.06	25	78.54	490.87
¼	22.78	41.28	¼	51.05	207.39	¼	79.32	500.74
½	23.56	44.18	½	51.84	213.82	½	80.11	510.71
¾	24.35	47.17	¾	52.62	220.35	¾	80.90	520.77
8	25.13	50.26	17	53.41	226.98	26	81.68	530.93
¼	25.92	53.46	¼	54.19	233.70	¼	82.47	541.19
½	26.70	56.74	½	54.98	240.53	½	83.25	551.55
¾	27.49	60.13	¾	55.76	247.45	¾	84.04	562.00

TABLE (*Continued,*) SHOWING CIRCUMFERENCES AND AREAS OF CIRCLES, *for either inches, feet, yards, links, or chains,*

Dia.	Circum.	Area.	Dia.	Circum.	Area.	Dia.	Circum.	Area.
27	84.82	572.56	36	113.10	1017.9	45	141.37	1590.4
¼	85.61	583.21	¼	113.88	1032.1	¼	142.16	1608.2
½	86.39	593.96	½	114.67	1046.4	½	142.94	1626 0
¾	87.18	604 81	¾	115.45	1060.7	¾	143.73	1643.9
28	87.96	615.75	37	116 24	1075.2	46	144.51	1661.9
¼	88.75	626.80	¼	117.02	1089.8	¼	145.03	1680.0
½	89 53	637.94	½	117 81	1104.5	½	146.08	1698.2
¾	90.32	649.18	¾	118.59	1119.2	¾	146.87	1716 5
29	91.11	660.52	38	119 38	1134.1	47	147.66	1734.9
¼	91.89	671.96	¼	120 17	1149.1	¼	148.44	1753 5
½	92.68	683.49	½	120.95	1164.1	½	149.23	1772.1
¾	93.46	695 13	¾	121.74	1179.3	¾	150.01	1790.8
30	94.25	706.86	39	122.52	1194.6	48	150.80	1809 6
¼	95.03	718 69	¼	123.31	1209.9	¼	151.58	1828.5
½	95.82	730.62	½	124 09	1225.4	½	152.37	1847.5
¾	96.60	742.64	¾	124.88	1241.0	¾	153.15	1868.6
31	97.39	754.77	40	125.66	1256 6	49	153 94	1885.7
¼	98.17	766.99	¼	126.45	1272.4	¼	154 72	1905 0
½	98 97	779.31	½	127.23	1288.2	½	155 51	1924.4
¾	99.75	791.73	¾	128.02	1304 2	¾	156.29	1943.9
32	100 53	804 25	41	128.81	1320.3	50	157.08	1963.5
¼	101.32	816.86	¼	129.59	1336 4	¼	157.87	1983.2
½	102 10	829.58	½	130.38	1352 6	½	158 65	2003 0
¾	102.89	842 39	¾	131.16	1369.0	¾	159 44	2022.8
33	103.67	855.30	42	131.95	1385.4	51	160.22	2042.8
¼	104.46	868.30	¼	132.73	1402.0	¼	161.01	2062 9
½	105.24	881.41	½	133.52	1418.6	½	161.79	2083 1
¾	106.03	894.61	¾	134 30	1435.4	¾	162.58	2103 4
34	106.81	907.92	43	135.09	1452.2	52	163.36	2123.7
¼	107.60	921.32	¼	135.87	1469.1	¼	164.15	2144.2
½	108.38	934.82	½	136.66	1486.2	½	164.93	2164.8
¾	109.17	948.41	¾	137.45	1503.3	¾	165.72	2185.4
35	109.96	962 11	44	138.23	1520.5	53	160.50	2206.2
¼	110.74	975.90	¼	139.02	1537.8	¼	167.29	2227.1
½	111.53	989.80	½	139.80	1555.3	½	168.08	2248.0
¾	112.31	1003.7	¾	140.59	1572.8	¾	168.86	2269 1

TABLE (*Continued*), SHOWING CIRCUMFERENCES AND AREAS OF CIRCLES, *for either inches, feet, yards, links, or chains.*

Dia.	Circum.	Area	Dia.	Circum.	Area.	Dia.	Circum.	Area.
54	169.65	2290.2	63	197.92	3117.3	72	226.20	4071.5
¼	170.43	2311.5	¼	198.71	3142.0	¼	226.98	4099.8
½	171.22	2332.8	½	199.49	3166.9	½	227.77	4128.3
¾	172 00	2354.3	¾	200.28	3191.9	¾	228.55	4156.8
55	172.70	2375.8	64	201.06	3217.0	73	229.34	4185 4
¼	173.57	2397.5	¼	201.85	3242.2	¼	230.12	4214.1
½	174.36	2419.2	½	202.63	3267.5	½	230.91	4242.9
¾	175.14	2441.1	¾	203.42	3292.8	¾	231.69	4271.8
56	175.93	2463.0	65	204.20	3318.3	74	232.48	4300.9
¼	176.72	2485.1	¼	204 99	3343.9	¼	233.26	4330.0
½	177.50	2507.2	½	205.77	3369 6	½	234.05	4359.2
¾	178.29	2529.4	¾	206 56	3395.3	¾	234.83	4388.5
57	179.07	2551.8	66	207.35	3421.2	75	235.62	4417 9
¼	179.86	2574.2	¼	208.13	3447 2	¼	236.41	4447 4
½	180.64	2596.7	½	208.92	3473.2	½	237.19	4477.0
¾	181.43	2619.4	¾	209.70	3499.4	¾	237.98	4506 7
58	182.21	2642 1	67	210.49	3525.7	76	238.76	4536.5
¼	183.00	2664.9	¼	211.27	3552.0	¼	239.55	4566.4
½	183 78	2687.8	½	212.06	3578.5	½	240.33	4596.4
¾	184.57	2710.9	¾	212 84	3605.0	¾	241.12	4626.4
59	185.35	2734.0	68	213.63	3631 7	77	241.90	4656.6
¼	186.14	2757.2	¼	214.41	3658.4	¼	242.69	4686 9
½	186.93	2780.5	½	215.20	3685.3	½	243 47	4717 3
¾	187.71	2803,9	¾	215.99	3712.2	¾	244.26	4747.8
60	188.50	2827.4	69	216.77	3739.3	78	245.04	4778.4
¼	189.28	2851.1	¼	217.56	3766.4	¼	245 83	4809 1
½	189.07	2874 8	½	218.34	3793.7	½	246.62	4839.8
¾	190.85	2898.6	¾	219.13	3821.0	¾	247.40	4870.7
61	191.64	2922.5	70	219.91	3848.5	79	248.19	4901.7
¼	192 42	2946.5	¼	220.70	3876.0	¼	248.97	4932.8
½	193.21	2970 6	½	221.48	3903.6	½	249.76	4963 9
¾	193.99	2994.8	¾	222.27	3931.4	¾	250.54	4995.2
62	194.78	3019.1	71	223.05	3959.2	80	251 33	5026.6
¼	195 56	3043.5	¼	223.84	3987.1	¼	252.11	5058.1
½	196.35	3068.0	½	224.62	4015.2	½	252.90	5089.6
¾	197.14	3092.6	¾	225.41	4043.3	¾	253.67	5121.2

TABLE (*Continued*), SHOWING CIRCUMFERENCES AND AREAS OF CIRCLES, *for either inches, feet, yards, links. or chains.*

Dia.	Circum.	Area.	Dia.	Circum.	Area.	Dia.	Circum.	Area.
81	254.47	5153.0	87	273.32	5944.7	93	292.17	6792.9
½	256.04	5216.8	½	274.89	6013.2	½	293.74	6866.2
82	257.61	5281.0	88	276.46	6082.1	94	295.31	6939.8
½	259.18	5345.6	½	278.03	6151.4	½	296.88	7013.8
83	260.75	5410.6	89	279 60	6221.2	95	298.45	7088.2
½	262.32	5476.0	½	281.17	6291.3	½	300.02	7163.0
84	263.89	5541.8	90	282.74	6361.7	96	301.50	7238.2
½	265.47	5608.0	½	284.31	6432 6	½	303.16	7313 6
85	267 04	5674.5	91	285.89	6503.9	97	304.65	7389.8
½	268.61	5741.5	½	287.46	6573.6	98	307.84	7542.9
86	270.18	5808.8	92	289.03	6647.6	99	311.00	7697.7
½	271.75	5876.6	½	290.60	6720.1	100	314.16	7854.0

CIRCUMFERENCES.—If the diam. is between 100 and 200, call the radius the diam. and double the given circumference. If between 200 and 300, enter the Table with one-third the diam., and multiply the given circumference by 3. If between 300 and 400, or 400 and 500, enter the Table with one-fourth or one-fifth, and multiply by 4 or 5, and so on for any number, taking care to multiply the given circumference by the same figure that you divided the diam. by.

EXAMPLE.—Required the circumference of a circle whose diam, is 152.—Enter the Table with the radius 76, the circumference given is 238.76 and 238.76, x 2 = 477.52, the circumference required.

AREAS.—If the diam. is more than 100, enter the Table with one-half or one-third, &c., as above, and multiply the area given by (4, or 9 &c.,) the *square* of the figure you divided the diam. by.

EXAMPLE.—Required the area of the circle given in the last example. Opposite to 76 the area given is 4536.5 and 4536.5 x 4 [2 x 2]= 18146.0, the area required.

CAPACITY.—The given or ascertained areas in inches, multiplied by 0.0443, or the areas in feet multiplied by 6.23, will give the number of gallons equal to the area, by one foot in depth.

EXAMPLE.—Required the contents per lineal foot of a 15 in pipe The area given is 176 71 and 176 71 x 0433=7.65 gallons, See p. 16. The contents per foot in depth of a tank 12 ft diam. will be = 113.10 x 62.3 = 704.6 gallons

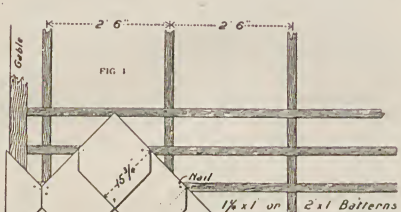
ASBESTOS CEMENT.

This building Material is made of Asbestos Fibre and Hydraulic Cement, in the form of large flat sheets, about ¼in. thick, and roofing slates in three colors. It is specially adapted for the covering of walls, ceilings, and roofs.

Its special qualities are toughness, lightness, coolness, and fire-resistance. It is useful for quickly erected light and cool constructions, ceilings for bay windows, or where vibration and heat have to be provided against.

Being of a uniform mottled grey color, it harmonises with almost any color of fixture in its natural state. Special paints and distemper are sold for coloring.

Special ridge and hip pieces of this material are also made, but galvanised iron or terra-cotta ridging can be used in the usual way.



ASBESTOS CEMENT SLATES.

Slates, Tensile strength, is said to be 5781 lbs. per square inch.

Crushing force, 8281lbs. per per square inch.

Lap, Slates and Battens, required per square.

The slates, about 16in. x 16in. square, are laid diagonally, with a 2¾in., and 3½in., and 4in. lap, according to pitch of roof; nailed at three corners with galvanised flat-headed nails.

Lap of Slate.	Gauge of Battens.	Battens per Square.	Number of Slates.	Weight per Square.
2¾in.	9in.	133	85	246lbs.
3½in.	8½in.	141	97	270lbs.
4in.	7½in.	150	100	302lbs.

Uralite is another name for this material.

A.S. Slates laid, weigh 22lbs. per sq. yard.

Alternative.—If it is required to drop the tip of slate, the following table must be used :—

Cut for Lap.	Laid with Lap.	Gauge of Battens.	No Slates Required.	Weight per Square
2¾in. lap	3½in. lap	8⅞in.	90	262lbs.
3½in. lap	4in. lap	8⅜in.	103	296lbs.

Labor laying ... ... 6/– to 7/6 per square. (*See roof tiles*)

PRICES OF ASBESTOS SLATES.

Slates, 16in. x 16in.—

Reds, Purple, Blue Black ... ... per 1000	£20	10	0
Green ... ... „	£18	10	0
Copper clouts ... ... 20/- per	1000	nett	

Full Crates, delivered in City, rail or boat, free. Small charge for packing smaller lots.

Asbestos Cement Roofing Slates, per square—10 x 10 feet :—

3½in. lap, 91 slates at £21 per 1000 ... =	£2	2	0
Battens, 141ft. run, or 25 sup. ft. at 20/- per 100—			
per sup. ft. ... ... =	0	5	0
Copper clouts and waste	0	2	0
Labor, per square	0	6	0
Nett	£2	15	0

ASBESTOS CEMENT SHEETS.

Light Sheets (light grey) in crates—	per sq. yd.		
8ft. x 4ft. x 5.32in., 4ft. x 4ft. x 5/32in.... ...	0	2	0
8 x 4 x 3/16	0	2	0
Reinforced Sheets	0	2	6
4 x 4 x 3/16, dark slate, double faced	0	2	5
4 x 4 x 5/32, grey, double faced	0	2	2
8 x 3 x 5/32, 6 x 3, 4 x 3, grey	0	2	2
Thin flat-headed Galvanised Nails	-/6 per lb.		

Example of Cost: Plain Walling—

10ft. x 10ft., equals 100 square feet :—			
3/16 Cement Sheets one side—11 yards at 2/3	£1	5	0
Waste and nails	0	5	0
Labor, per square	0	5	0
Add 3 x 2 plates, machine-dressed battens and studding, 2 feet apart (**see carpenter**) ...	1	5	0
Nett	£3	0	0
If double sided add extra sheets	£1	10	0

PANELLED CEILING.

If sheets are used as a ceiling, with joists showing, dressed in room as panelling, the net cost complete would be from 6/- upwards per super yard.

OTHER FIBROUS CEMENT OR COMPOSITION SHEETS.

"Compo" Board Lining—

In sheets 4ft. wide, from 10ft. to 18ft. lengths, per square foot..	0	3	
Plaster Board is a compressed composition to be used as a substitute for lath and the first coat of plaster—			
Sheets 32in. x 36in. x ⅜in. thick, each	1	3	
(Eight-ninths of a square yard.)			

"Sackett" Board is a flexible board made of wood fibre and lime cement, supplied in sheets 3ft. x 2ft. 8in. x ¼in. thick, used as a groundwork surface for plaster in lieu of laths.

SUGGESTIONS FOR FIXING.

The Standards, Studs, or Battens, in order to give a level surface should be of equal thickness, and spaced accurately at 24in. centres, with cross pieces nailed between the studs to receive the end of the sheets, butting together.

To make an even surface throughout, fill joints with Alabastine or other slow setting plaster. Rub down with pumice powder and glass paper.

To ensure an absolutely flush joint for unfilleted work, the edges should be shot with a plane and rendered with plaster as above.

Asbestos Cement Sheets can easily be cut with hand saw (fine tooth), or deeply marked, or cut with chisel and straightedge and broken.

As an alternative the joints may be covered with ½in. wood fillets, or other panelling material, and in the case of the vertical joints of outside work. Asbestos Cement Fillets 3in. x 3/16in. thick may be used for a covering, the horizontal points may be filled and stopped as above.

This material differs in quality, and is sold under different names, as **"Fibro-cement," "Poilite," "Eternite," and "Titanic,"** &c. (all trade names). See advt. pages 9, 33, 37.

ASBESTOS DECORATIONS.

Made in Usual Sizes.

The high relief ceilings, friezes, and dadoes, closely resemble plaster and wood mouldings.

Fillings, per square foot, from 2d. ; friezes and dadoes, per square foot, from 4d. ; ceilings, high relief, per square foot, from 4d.

"Sackett" Board, "Compo" Board, etc., see patent partitions.

Asbestos Rope covering for steam pipes—Asbestos Cement, in three qualities, from 14/–, 16/– and 20/– per cwt. in bags. To make Asbestos Cement partitions soundproof and walls heat-resisting, the space between sheets could be filled with sawdust, alpinite, or any other packing.

Asbestos Fibrous Cement Sheets are sold in Melbourne by the square yard, as under :—

	Per Case	per s. yd.
Sheets,	16—3 mill = ⅛-inch thick	1/10
	13—4 mill = 3-16-inch thick	2/–
	10—5 mill = ¼-inch	2/4

Slates, 16in. x 16in., grey, per 1000, £19/5/– ; coloured, £21/–/–.

Asbestos, Corrugated Roofing Sheets, are made for dairies and cool sheds, 3/–.

Asbestos Roofing Felts are also made—a sandwich of bitumen felt with asbestos fibre covering, price per roll of 12 yards, 40/–.

ASPHALTE.

Seyssel asphalte is made from a natural calcareous bitumen, found at Seyssel, near Pyrmont, department of l'Aix; and "contains 90 parts of carbonate of lime to about 10 parts of bitumen"; this is improved by the addition of tar or pitch by the Patentee.

The calcareous asphalte rock of Val de Travers, in the Canton of Neufchatel, in Switzerland, contains 10 per cent. bitumen.

Bitumen, naturally combined with calcareous earth, forms a compact slightly elastic substance which is as durable as granite, "but no artificial mixture of coal tar and calcareous earth, carbonate of lime, or chalk has ever been produced at all approaching the natural asphaltes in durability. This is partly due to the difficulty in imitating the natural combination in mixing, but chiefly to the fact of the natural bitumen, being a kind of mineral tar, which will sustain 170 deg. of heat without injury, whereas asphalte made from coal (*vegetable*) tar, becomes soft at 115 degrees of heat.

Bitumen will cement wood to stone or iron, viz., a waterbar on top of a slate threshold.

Pure Bitumen is one of the oldest substances known as a waterproof material. It was employed in building ancient Babylon and Nineveh roof gardens, and for cementing the stones together, thousands of years ago, and this same bitumen, what there is of it, is in as good preservation to-day as when laid.

Pure Bitumen, on wharf or rail, £10 to £16 a ton, according to degree of refining.

Special Blocks, for Sewerage Pipe Joints, mixture of coal-tar, bitumen, and bluestone dust ... ... £7 per ton

COST OF LAYING ASPHALTE 1in. THICK.

LABOUR ONLY.

	per sq. yd
Price for large surfaces, from	1/2 to 1/6
For Roofs, about 200 sq. yds. and 40 to 50ft. above pavement, from	2/– to 2/6
Taking up old asphalte paving, 4in. thick, and removing debris 30 feet, add	–/6
Taking up old blue metal tar-paving up to 4in. ditto ...	–/5
Taking up old cinder tar-paving ditto	–/4
Loading debris into cart per cubic yard load ...	–/4

MATERIAL AND LABOR IN MELTING AND SPREADING.

Five men, working one day of 8¾ hours, can melt and spread 6cwt. of asphalte (mixed with 6lbs. of tar), 1 inch thick, using a 6cwt. caldron.

6cwt. asphalte will cover 7⅓ yards ¾in. thick.

Ditto, 5¼ yards, 1in. thick.

3½ tons of coal required to melt 1 ton of asphalte in a 6cwt. caldron.

Cost of Hoisting Material for Asphalte Floor.

For every 10 feet in height above mixing level add per sq. yd. 1/–.

Asphalte for Roads.—See Roads.

ASPHALTE FLOORS, ROOFS, Etc.

Prices, per super yard, Laid complete.

ROOFS.

	Melbourne.	Sydney.
(Rock) Asphalte, 1in. thick (2 coats) ...	9 0	9 0
Trinidad-Atzo Val de Travers, 1in. thick ...	10 0	10 0
Ditto (or Patent) Asphaltum, 1in. thick, 2 coats		8 0
Ditto (or Patent) Asphaltum, ¾in. thick, 2 coats		7 0

FLOORS OR PAVEMENTS.

Val de Travers or Neuchatel Asphalte, 1in.	10 0	12 0
Limmer (rock) Asphalte, 1in. thick		8 0
Ditto ditto ¾in. thick		7 0
Ditto, ditto, ½in. thick, Horizontal dampcourse		4 0
Ditto, ditto, ditto, ½in. thick		6 0

Paint, Asphaltum, 1 coat, 1/–; 2 coats, 1/6 per sq. yd.
Ditto, 5 gallon drums, 7/6 per gallon.
Marine Glue (Patent Asphaltum Co.), black, in 56lb. tins, 11/–.

When the dampcourse is applied to the face of walls, it is applied in coats ¼in. thick.

For quotation and quantities see page advt. 5 and 12.

MALTHOID AND RUBEROID ROOFING FELTS.

In Rolls (72ft. x 3ft. wide—24 yards each roll.)
One roll will cover 20ft. x 10ft., or 3 squares, including laps.

	½-ply	1-ply	2-ply	3-ply
Ruberoid	19/–	23/6	30/–	37/6
Malthoid	17/6	22/–	29/6	37/–
Resistoid Roofing	16/–	21/–	28/9	35/–
Maltha Roofing, Am.	19/–	23/3	30/–	37/9

P. & B. Ready Roofing, gravelled, 32ft. x 40in. wide, p.s.q. ... 30 0
(*See manufacturer's advt., p.* 15.)

OTHER BITUMINOUS ROOFING FELTS.

	per Roll.
Kaloroid is a Colored Ruberoid	40/– to 53/–
Vulcantile is another similar Felt	53/–
Ornamentile is a Vulcanite Bituminous Roofing made in rolls 16 inches wide, with shingle pattern, cut to various designs. The color is added by a surface of crushed slate or minerals of different shades of greys, Terra Cotta, brown, and grey green, 4 rolls of 50lbs. each, cost per square	33/–
Ruberoid Cloth, 29in. wide, per yard	1/6
Ruberoid, Red or Brown Roofing, 40/– ; Green, 53/6 per roll ; covers 210 square feet.	

A layer of gal. iron wire netting, large mesh, stretched tightly over rafters or battens, form a very good and cheap support for these roofing felts.

BUILDING WATERPROOF PAPERS.

P. & B. Rolls, 336ft. x 3ft., cover 10 squares—1-ply 17 9
2-ply, 22/6 ; 3-ply, 29/– ; 4-ply, 40/–.
Vertical Dampcourse, per roll, 42/– ; 21/6 per square, including joint compound.
Malthoid Cement, 8/– per gal. ; one gallon will cover two squares.
Waterproof Felt, No. 7, 32in. wide, 18/6 per roll, about 150 feet long, covering 400 square feet.
Saturated Felt, No. 12, 36in. wide, 12/6 per roll, about 66ft. long, covering 200 square feet.
For use under metal, slates, or tiles.

DAMPCOURSE.

	Melbourne.	Sydney
Horizontal (Rock) Asphalte, ½in. thick	5 0	5 0
Ditto, Trinidad (or Patent) Asphaltum, ½in. thick	6 0	4 0
Ditto, Trinidad, ⅜in. thick...	4 0	3 6
Vertical Trinidad (2 coats), ½in. thick	7 0	4 0

Portable.—For portable in rolls.—*See advertisement, page 5.*

WATERPROOF FELTS, PAPERS AND MATERIAL ONLY.

Trinidad roofing felt, 66 per cent. Bitumen ; 34 per cent. coarse fibric felt, is put up in rolls, 80 feet long by 32in. wide.
Per roll 2-ply, weight 84lbs. Price 28/–
Per roll 3-ply, weight 100lbs. Price 25/–

DAMPCOURSES.

Various. per sup. ft.

Slates and cement, 2 courses in cement, laid horizontal 0 9
Ditto, Vertical 1 0
Glazed Earthenware, 1¾in. thick (*see Brickmakers' Materials*), bedded in cement.—For 4½in. walls, 6d. per foot run ; 9in. walls, 9d. ; 14in. walls, 1/– ; 18in. walls, 1/6 per foot run.
Leadite Dampcourse in rolls in 10 feet lengths, 4½in. wide, 1/9 ; 9in. wide, 3/6 ; 14in. wide, 5/3.
Bitumen and Lead and Bitumen Dampcourse.
Asphalt Dampcourse.—**(See page advt. 5 and 15.)**

RUBEROID, MALTHA, AND MALTHOID DAMPCOURSE.

In Rolls.

Material only, laying and waste, per roll, 1/– extra.

Width in inches	4¾in.	9½in.	14in.	18½in.	23in.	27½in.	36in.
Price per roll 72ft.	6/–	12/–	17/–	22/–	26/6	31/–	37/6

Maltha and Vulcanite Dampcourse, 4½in. wide, 5/– ; 9in., 9/6 per roll.
Jointing and Coating Paint for Roofs : Black, 6/– per gal. ; red, 8/–, covering per gal. 200 square feet to 250 square feet.

TAR PAVEMENTS.

Material necessary for 10 sq. yards, 3in. thick. s. d.

14 gallons of Tar to 1 ton of metal and screenings, mixed to 90 degrees is sufficient

Coke dust and tar, mixed for spreading, per ton, 4/6 ; equals 20 yards spread 1in. thick—net 9 0

40 gallons of tar will mix 5 tons of blue metal shivers.

N.B.—Tar required for 6in. tar concrete paving, viz., 3in. of 2in. metal, tarred after spreading, 2in. smaller metal mixed with tar, topped with 1in. tar and coke dust, requires from $1\frac{1}{4}$ to $1\frac{1}{2}$ gallons per super yard. (See Road making.)

Tar per gallon at Gas Works : Melbourne, $6\frac{1}{2}$d. ; Sydney ... 0 3

Larger quantities less ; add cartage.

PAVINGS.

Laid Complete, per sq. yard.

Bluestone Cement Concrete, 6in. thick, foundations from 6 0

Tarred Blue Metal Screening, 1in. thick ... from 2 0

Asphalte Fillet, 3 x 1, around basements or walls, per lineal yard 0 6

TARRED PAVEMENTS.

Bluestone Metal, 3in. thick, composed of $1\frac{1}{4}$ gauge metal, with 1in. top dressing of $\frac{3}{8}$ screenings, and 20 per cent. dust, mixed in the proportion of 25 gallons of tar to 1 cubic yard screenings, rolled and sanded, per square yard 3 0

TAR-CONCRETE OR COMPOSITION PAVEMENT.

Pavement.

Namely, $2\frac{1}{2}$in. of 2in. bluestone metal foundation, 1in. coarse, and $\frac{1}{2}$in. fine screenings, the whole mixed with tar, and dusted over with bluestone dust.

4in. thick ... 3 6

5in. thick ... 5 0

6in. thick ... 6 0

Painting with hot tar and sand, per super yard 0 3

1in. Tar and Sand Top-dressing and Rolling, fine top ... 1 3

Tar concrete, 3in. of 2in. sandstone metal, covered with 1in. coke dust and tar and well rammed, per super yard ... 1 9

Tar concrete footpaths, with gravel foundation covered with tarred blue metal screenings 2 5

TARRED ASH PAVEMENT.

Example Materials Required.

20 square yards, $1\frac{1}{2}$ inches thick when rolled

One load ashes	4	6
20 gallons tar at works, 3d.	7	6
1 mile cartage	2	6
Materials—Net cost	14	6

Add labor, spreading and rolling.

N.B.—If on clay foundations, spread 2 inches of dry ashes to prevent cracking.

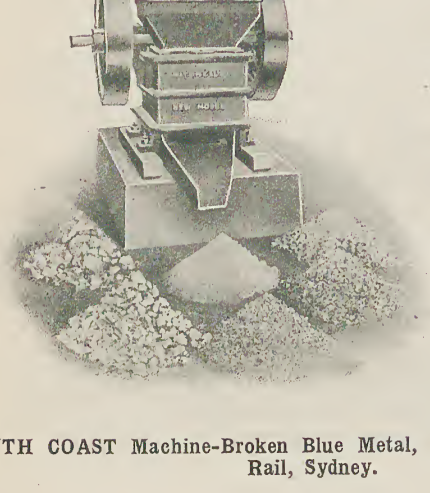
Melbourne Prices, Retail.

Coal Tar, retail 8d. per gallon, $6\frac{1}{2}$d. per cask.

BALLAST AND METAL.

PRICES.

Subject to Fluctuation.



Stone Breaker with 16 x 9 inch jaws cost £155, and stationary 6 h.p. engine. Will break 10 tons per day.

SOUTH COAST Machine-Broken Blue Metal, Delivered on Wharf or Rail, Sydney.

	Ton of 24 cub. ft. s.	d.
1½in., ¾in. and ⅜in. Blue Metal Screenings, including dust ...	12	0
2½ gauge (see advt., page 12)	9	0
Melbourne Bluestone, 1in. to 2½in. gauges, delivered on jobs, Melbourne	8	0
Screenings and Dust	9	0
Nepean River Broken Metal and Screenings, 2½in., 2in. and 1½in. gauges, per ton of 25 cubic feet	10	0
Ditto, No. 1 Screenings, per ton of 28 cubic feet	12	0
Ditto, No. 2 Screenings, per ton of 22 cubic feet	12	0
White (quartz **Metal**, from Five Dock), 2½in. gauge, delivered in Newtown (about 3½ miles lead)	9	9
Broken (earthen) pipes for concrete	5	6
Waste bricks or clinkers from brick kilns	5	0

HORNSBY QUARRIES.	F.O.R. Hornsby, Per Ton. s.	d.	Darling Harbour, Per Ton. s	d.
¾in. Breccia Screenings	11	0 ...	13	0
1½in., 2½in. gauges Road Metal	9	0 ...	11	6
¼in. Ballast Screenings, including dust ...	10	0 ...	12	6
Special quotations are given for quantities.	See advt., page 3.			

RIVER SAND AND GRAVEL.

In Trucks at Emu Plains.

	s.	d.
Grit, per ton	4	6
Screened Sand, per ton	3	9
2in. Ordinary Gravel, per ton	4	9
1½in. Gravel	5	10

At Alexandria or Darling Harbour.

Grit, per ton :	6	8
Screened Sand, per ton	5	11
2in. Ordinary Gravel, per ton	6	11
1½in. Gravel	8	0
Screened Sand, Melbourne, city delivered	8	0

HAND-BROKEN ROAD METAL.

Labour only, per Cubic Yard.

Wages of Stonebreaker, 1/1½ per hour.

	s.	d.
Bluestone or trap rock, broken to a 2½in. ring gauge	3	9
White metal	2	9
If hard sandstone, gritstone, brick or quartz	2	6
Wheeling and spreading within 20 lineal yards	1	9

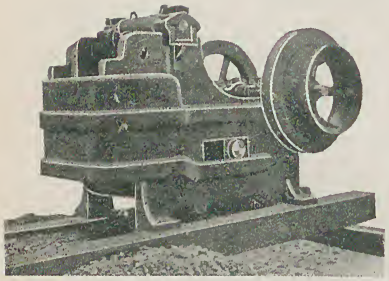
WEIGHT OF RUBBLE ROAD METAL, Etc.

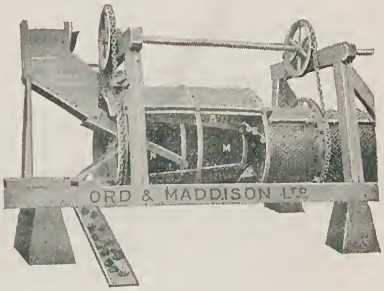
	p. cu. yd. cwt.	cu. feet per ton.
Granite rubble	30	18
Bluestone rubble	28	19
Sandstone rubble	28	19
2½in. Bluestone Metal	26	24–26
2in. Bluestone metal	25	25–27
2½in. Sandstone metal	24	22½
2in. Sandstone metal	23	22
Sand or fine gravel ballast	22½	24
1in. Bluestone screenings	23	27–28
Small Coke or Breeze	12	41
Shingle or Old Mortar	21½	25
Mortar, new	19	28

STONEBREAKING MACHINES will break from 6 cubic yards of 2½in. ring gauge bluestone per hour, with two men to supply the stone, etc., at about 1/–.

If spalls or small rubble can be obtained at a quarry within a mile of the machine, 2½in. ring gauge bluestone metal may be supplied and loaded into trucks or drays at a cost of 4/6 per cubic yard.

STONE CRUSHERS.





No. 1.—B. Crusher. Chain-Screen for Broken Stone.

No. 1-B Crusher, weight 2200lbs., capacity about 25 tons 2½in. metal per day of eight hours. This Crusher would require 4 to 6 h.p. to drive it.

It is fitted with extra pair of Jaws and a Toggle Plate, price £155 net cash f.o.b. or f.o.r. Sydney.

In measuring ballasting for railways or tramways, the sleepers should be deducted for net measure.

For different makes see agents' advt. pages 7, 9, 13, 14, and outside cover.

CLAY PUDDLE.

Per Cubic Yard.

Wages of laborer, 1/- per hour, with use of tools.	s.	d.
Excavating for clay, getting, filling and wheeling one stage, not exceeding 20 yards	2	3
Chopping and watering for tempering	1	0
Tempering after clay has been soaked	1	3
*Filling, wheeling one stage, tipping to place required, and treading	1	6
	5	9
If unbearing is required to get the clay, add per foot in depth to be removed	0	6

When the clay is tipped into, and can be tempered in the place required, leave out item marked thus*.

Clay puddle, when properly prepared, should be similar to brick earth ready for moulding.

The use of tar concrete, coke dust and tar, mixed together in thin layers, would form an excellent substitute for puddle where clay is scarce. It would also save excavation, as two inches of this stuff would be ample, instead of nine inches of clay.

UNITED LABORERS' AWARD.

WAGES.

As the wages of laborers skilled and otherwise are graded for the different occupations and trades, I here give the latest award rate for your contemplation, so that you may make an allowance in pricing where any difference occurs in the rate stated at which any calculated table or cost is made.

LABORERS SKILLED AND OTHERWISE.

Award for United Laborers (August, 1913).

The No. 5 Wages Board of the Laborers' Group, which applies to members of the United Laborers' Protection Society, issued its award to-day.

The hours of work are not to exceed 48 a week, and the time is to be worked in shifts of 8¾ hours from Mondays to Fridays, and 4¼ hours on Saturdays. On ordinary working days overtime work is to be paid for at time and a half rates, while for Sunday and holiday work double time is stipulated.

The wages fixed are :—Concrete mixers and wheelers of material in connection therewith, 10/– a day ; concrete packers, 10/4 a day ; concrete packers in tunnels or drives, 10/8 a day ; concrete workers making monier, patent, or concrete pipes, first-grade men, 11/– a day, second-grade, 10/–, third-grade (improver for 12 months), 8/6 ; pipe-layer, laying monier, concrete and earthenware pipes, first-grade, 11/6, second-grade, 10/6 ; conduit layer and jointer, 12/– ; cement mixer, 9/9.

Laborers unloading, carrying and stacking cement, 1/6 an hour ; laborers engaged as hammer drill jumper and spawler men, 10/– ; timberer cable troughing, 10/– ; timberers, first-grade, 12/–, second-grade, 11/–, assistant, 9/10 ; manhole builder, 12/– ; tool sharpener, first-grade, 11/8, second-grade, 11/– ; navvies, pick and shovel men, 9/3 ; sand shifting, 9/4 ; picking exclusively, 9/6 ; sinking shaft under 10 feet, 9/4, over 10 feet, 9/6 ; using pick and shovel in ground affected by tidal waters, 11/– ; using pick and shovel at sea-wall, wharf, or retaining wall in connection with reclamation work, 9/6 ; Navvies with horse and dray, 14/–, and assist in loading if required ; for each additional horse, 7d. an hour extra ; gangers in charge of conduit construction, 13/6 a day, wet or dry ; first-class gangers at other work in charge of 12 men and over, 13/4, wet or dry ; second-class ganger, with from 6 to 11 men, 12/3, wet or dry ; third-class ganger, working with his gang if required, and in charge of less than six men, 10/6, wet or dry. Youth labor : Under 16 years, 4/– a day ; under 17. 5s. ; under 18, 6s. ; under 19, 7/– ; under 20, 8/–.

BRICKLAYER.

MEASUREMENT.

In measuring brickwork all flues are to be measured as solid work below the roof, but above the roof (for labor only) the girt is taken by the thickness of brickwork round flue, and this multiplied by the height, including projections which are girted. Piers, pilasters, quoins, etc., are also girted for labor only.

The shortest method of reducing cubic feet to the standard thickness of 1½ brick, is to deduct one-ninth, or multiply by 8 and divide by 9.

To reduce 1 brick to 1½ brick wall, deduct one-third from the given area.

In measuring height of walls, the wall-plate is included for setting, or allowed for separately.

Footings.—If the projection of the footing is in regular offsets, three or more courses high, the average dimension is sufficient; otherwise, each course must be taken separately.

Then take the walls above the footings to the ground story, each thickness storey by storey, to the top.

All additions, as chimney breasts, etc., for each floor to be taken.

If any brickwork is carried up in cement, it can be allowed for and placed under a separate head.

Measure chimney shafts, the width, height, and thickness.

To measure the projections for cornices, courses to chimney shafts, etc., take the several lengths and multiply by their width, and the thickness beyond the face of the brickwork previously taken. Circular work is measured on the curve, in the centre of the wall, for very quick curves and otherwise by external face.

The Deductions.—Deduct all windows, doors, openings, etc., on each floor. It is recommended to take the width of the opening first, and then the height.

If the reveals are square, deduct in one dimension. If recessed, they must be taken in two or more.

Facings are measured by the square yard. Take the width of the walls to be faced, with all returns, and then the height, deducting any stone or cement cornices, plinths, facing, etc., out of such height; also deduct windows or other openings. Keep moulded bricks separate.

Flat joint and tuck pointing are measured by the square yard.

Number all sash and door frames, bedded and pointed; if over 28 feet superficial, keep separate in estimate.

Brick walls, if classified together according to their thickness, admit of a more equitable estimate being made than by the common method.

As many builders prefer to measure their brickwork by the thousand bricks, a rough and ready, and fairly accurate way of arriving at the number of bricks in job is to measure superficial area, and reduce the walls to 9-in. work, then allow nine bricks per super foot.

Example: A wall 20ft. long x 10ft. high equals 200 super feet; 200 x 9 = 1800 bricks required.

A Rod of Brickwork will take about 3700 Sydney machine-made bricks.

MEMORANDUM.

Good Mixture for Mortar, 1 Bag Lime.

Lime mortar of good quality will result from mixing one bag or 2cwt. of fresh burnt lime with an ordinary tipcart load of sand, about 32 bushels, or 25 cubic feet, and will be sufficient to lay about 1000 bricks.

For 4½-inch walls it is advisable that an addition of 10 per cent. of cement to mortar mixed as above will produce a stability and firmness in the wall that will more than repay the additional outlay.

1728 cubic inches equal 1 cubic foot. 46,656 cubic inches equal 1 cubic yard.

BRICKS.

Material Required to Make.

1000 bricks stacked close measures 55 cubic feet.

1000 bricks can be made from 3 cubic yards of solid clay.

1000 bricks require 8 to 10 cwt. of coal fuel—open kiln.

1000 bricks require 2 to 3 cwt. of coal in a Hoffman kiln.

A bricklayer's hod working load will hold 14 bricks, 12 on ladder, or ½-bushel of mortar.

Labor.—A good tradesman should lay per day of eight hours—600 to 800 bricks, 9in. work, in cement, struck joint; 800 to 1000 bricks, 14in. work, in mortar; 500 picked face worked.

ONE ROD OF BRICKWORK Contains—

272 feet super, of 1½ brick, or 13½ inches in thickness.

408 feet super of 1 brick or 9 inches in thickness.

816 feet to half brick, or 4½ inches.

Or 11¼ cub. yds., or 306 cub. ft. equals 235 cub. ft. bricks, 71 cub. ft. mortar.

FACE MEASUREMENT OF BRICKWORK.

13½ bricks to one foot of reduced brickwork.

9 bricks to one foot superficial of facing.

10 bricks to one foot superficial of gauged arches.

MATERIALS REQUIRED FOR A CUBIC YARD OF BRICKWORK.

384 bricks, 4 courses to the foot.

360 bricks, 4 courses to 13 inches.

336 bricks, 4 courses to 13½, or eight layers of 42 bricks each.

1½ bushels of cement or stone lime and 3 of sand, with joints averaging ⅜in. thick.

1 bushel cement or stone lime and 2 of sand, with joints averaging ¼-inch thick.

SUPER YARDS PER ROD.

90¾ super yards equals one rod of 4½-inch brickwork.
45 1/3rd super yards equals one rod of 9-inch work.
30 2/9 super yards equals one rod of 18-inch work.
27 feet cub. of mortar requires 9 bushels of lime and 1 yard of sand.

Bricks.—3672 bricks of 4 courses to 13½ inches, or ordinary brickwork.

Mortar.—3 to 1, 48 bushels of sharp sand, and 16 bushels or eight bags of stone lime.

Or 2 2/3rds. loads of sharp sand and 6 barrels of Portland cement or specified proportions.

A cubic yard of sand is twenty-three striked bushels.

One cask of cement contains 3½ cubic feet or 4 c. ft. loose.

Water.—200 gals, for mortar and 400 gals. for wet bricks—600 gals. at 1/6 per 1000 gals.—about 1/- per rod. Cement mortar only requires 162 gallons, or 3 hogsheads per rod.

Weight.—Sandstock bricks generally weigh 7lbs each, or not less than 74cwt. per thousand, say 13½ tons per rod, the mortar weighing about 3 tons at 24 cubic feet per ton. The rod of brickwork may therefore be considered to weigh about 16½ tons, or about 36cwt. per cubic yard.

Sydney machine-made bricks weigh 8lbs. to 8½lbs. each.

A rod of reduced brickwork will require about 170 hods of mortar.

Cost of a ROD OF BRICKWORK and Lime Mortar.

Bricklayers' wages, 12/- per day.
Laborers' wages, 9/4 per day.

Bricks of kiln : 3700 at 45/- ; cartage, 10/——55/- ...	10	3	6
4 bags of lime, 5/-, 1½cwt. each	1	0	0
4 loads of sand, 3/6	0	14	0
Water	0	0	6
Labor, laying 3700 at about 27/-	5	0	0
Add scaffolding, cartage and profit	17	8	0

Openings not deducted.

Cost of a ROD OF BRICKWORK in Cement Mortar, Mixed 3 to 1.

Bricks as above, about 3700 at 55/-	£10	3	6
5 casks Cement, at 14/-	3	10	0
4 loads of Sand, at 3/6	0	14	0
Labor, 3700 at 31/- per 1000	5	14	6
	£20	2	0

Brickwork in Cement, at 2 to 1.

Grouted solid will require two casks of cement in addition to the above quantity.

At 4 of sand to 1 of cement it will take about $3\frac{1}{2}$ casks to a rod of brickwork.

Having ascertained the price per rod as above, any alteration in the price of bricks can be allowed for at the rate of 3/9 per rod for each shilling per 1000. The proportions of cement or lime can also be varied as required.

Faced with O.K. Bricks.

Add extra cost of bricks (6/– to 12/– per 100) for 1233 face bricks laid ornamentally to pattern in proportion to cutting and fitting.

If the brick facing or face bricks are measured separately, half the depth of the reveals are included in the measurement.

HOOP IRON FOR BONDING, &c.

Per Lineal Foot.

Gauge No.	Weight in lbs.	Width in inches.	Gauge No.	Weight in lbs.	Width in inches.
13	0.62 :	2	16 1/16	0.26	$1\frac{1}{2}$
14	0.47 :	$1\frac{3}{4}$	17	0.21	$1\frac{1}{8}$
15	0.36 :	$1\frac{1}{2}$	18	0.16	1
18	0.34 :	$1\frac{3}{8}$	19	0.12	$0\frac{7}{8}$

	s.	d
Hoop Iron, in bundles, per cwt.	18	0

$\frac{1}{2}$-cwt. bundle, $1\frac{1}{2}$ x 1/16th, contains 180 ft.
$\frac{1}{2}$-cwt. bundle, $1\frac{1}{4}$ x 1/16th, contains 210ft.

LABOR AND SCAFFOLDING.

Per Rod, Reduced.

	£	s.	d.		£	s.	d.
Brickwork, garden wall bond, two faces	6	0	0	to	7	0	0
Brickwork in circular tanks, culverts, cess-pools or wells, $\frac{1}{2}$-brick thick, including trammels and centres, from	7	0	0	to	8	0	0
1 brick or more in thickness, from	5	0	0	to	6	0	0
Brickwork in mortar for $4\frac{1}{2}$in. walls ...	6	0	0	to	7	0	0
Ditto, do. for 9in. walls	5	10	0	to	6	0	0
Ditto, for $1\frac{1}{2}$ brick walls	5	0	0	to	5	10	0
Foundations or for walls, 2 or more bricks thick	4	10	0	to	5	0	6

Extras.

Add if worked fair on both sides, per sup. rod					0	10	0
Cavity walls					0	15	0
If in cement, add one-sixth.							
If old bricks with bats are used, add ...	0	9	0	to	0	10	0
Taking down brickwork, cleaning and stacking bricks, per rod	1	10	0	to	2	5	0
Ditto, per 1000 bricks	0	10	0	to	0	15	0

Add for mortar, cement or bricks, as per estimate.

The larger prices include flushing-up all joints.

LABOR AND SCAFFOLDING.

Per Cubic Yard.

Bricklayers' wages, 12/– ; laborer's, 10/4 per day.

	£ s. d.		£ s. d.
Bridges, abutments, etc., not less than 1½ brick thick			0 7 0
Arches, large culverts, or Skew bridges			0 7 0
Ditto, or culverts, 1 brick thick ...			0 10 0
Ditto, or culverts, ½ brick thick ...			0 12 6
Ditto, lining to sewers, ½ brick thick ...			0 12 6
Piers, small and lofty, 4 sides plumbed...			0 18 0
Coppers, ovens, furnaces, cupolas, or ½ brick culverts	0 9 0	to	0 15 0
Factory Chimneys, square, any height below 60ft.			0 10 0
Ditto, circular, any height, to 4ft. flue ...			0 12 0
Ditto, circular, over 6ft. to 12ft. flue ...			0 8 0
Ditto, octagon, any height, or church spires			0 14 0
Brickwork in cement, with wet bricks, for curved arches, circular on plan, per cubic yard, from	1 10 0	to	2 10 0

Chimneys more than 60ft. high, add one per cent. for every extra foot.

If built from inside, deduct 15 per cent.

If in cement, add one-sixth to these items.

SUNDRIES.

Labor, per foot run.

	s. d.
Cuttings to 9in. rakes or ramps	0 3
Ditto 14in. do. do.	0 4
Ditto 18in. do. do.	0 6
Chamfering angles	0 2
Cutting birdsmouth and squint	0 3
Raking out and pointing in cement to flashings	0 2

Pointing Door Frames.—Each.—Materials and Labor.

	s. d.		s. d.
Bedding and pointing sash and door frames ...	2 0	to	3 0
Fixing chimney pots	1 6	to	3 0
Setting register stoves, complete			10 0
Ditto, colonial ovens, from			10 0
Cutting out and bonding new work to old, toothing courses in mortar, per super ft. ...			0 6
Ditto, in cement mortar			1 0

Underpinning Walls.—Cutting away shale or old brickwork to 5ft. high, and rebuilding foundation footings, brick and cement, in lengths not exceeding 5 feet, labor only, per cubic foot, 1/–.

BRICK MATERIALS.

Sydney and Melbourne, per 1000 at Kiln.

	Melbourne. £ s. d.	Sydney. £ s. d.
Bricks—Common, or ordinary Patent Kiln bricks	2 0 0	2 5 0
Open kiln red faced	3 0 0	3 17 0
O.K., blue faced	3 10 0	3 17 0
Plain double pressed		4 5 0
Bullnose		7 0 0
Moulded headers		7 10 0
Moulded stretchers		8 0 0
Stops, single, 3d.; double, 6d.; 9 x 9...		0 1 0
Dry pressed, open kilns, bull nose or chamfered		4 15 0
Moulded or splayed		6 0 0
Patent interlocking faced bricks		4 0 0
D.P. Moulded Bricks to order	5 0 0 to	9 0 0
Cement, per cask	11/– to 15/–	
Lime, 2½ bushels per bag, 200lbs.	0 3 6	0 5 0
Sand, per load	3/3 to 4/–;	7/– to 8/-
Stove Bricks, per set, 2/6; backs		0 1 0
Paving Tiles, glazed, 12 x 6in. .. .. .. per 100 ..		1 10 0
Ventilator Bricks, terra cotta—		
9 x 3 .. 0/6 — 9 x 9, circular ..		0 2 3
9 x 6 .. 0/8 — 14 x 10, square ..		0 3 0
10 x 10 .. 1/6 — 9 x 6, louvre ..		0 1 3
Shell Lime .. .. per bag ..		0 4 0
Stone Lime 5/– per bag.. .. .. .. per ton ..		2 10 0
Portland Cement, per cask		0 14 0
Clean Sharp Yellow Sand .. .. .. per load ..		0 4 0
Hydraulic Lime .. .. .. per ton, from 68/– to ...		4 0 0
Terra Cotta Ventilators, plain, 9 x 3, 7/–; louvred, per doz.		0 10 6
Gal. Iron Air Bricks, 9 x 3, 5/–; 9 x 6, louvred, per doz. ..		0 7 6
Ditto, louvred, 9 x 6, 15/–; Terra Cotta, louvred, per doz...		0 10 6
"Acme" Patent Galv. Wall Ties ¾ x ⅛ .. per 100 ..		0 17 6
Galv. Wire Wall Ties .. .. per 1000 ..		0 17 0
Dampcourse Slates, Strong American, blue, 18 x 9 per 1000		9 0 0
Ditto, do. do. 14 x 9 .. .. ,,		7 0 0
Gal. Hoop Iron, 1¼ x 16 .. .. .. per bundle ..		0 9 0

Wages at 13/– per day of 8 hours.

SANDLIME BRICKS, AT BONDI.

Per at 1000 Works.	£ s. d.	£ s. d.
Redfaced	2 12 0 to	3 2 0
Common Bricks		2 2 0

Moulded Bricks made to order; prices in proportion.

As the prices are liable to fluctuation, for large lines, refer to makers' Monthly Lists.

To make new chimneys soot proof.—Mix ½lb. salt to bucketful of pargetting mortar.

FIRE BRICKS.

	£	s.	d.
English Fire Bricks, 9 x 4½ x 2½in., ... per 1000 ..	10	0	0
„ „ „ 9 x 4½ x 3in. .. .. „ ..	12	10	0
„ Arch Bricks, side and end wedges .. „ ..	12	0	0
Colonial Fire Bricks, 9 x 4 ½x 3in. .. .. per 1000 ..	6	0	0
„ Arch Fire Bricks .. .. .. „ ..	7	10	0
Fire Clay, English .. .. per cwt. ..	0	6	0
„ Colonial .. .. „ ..	0	4	6
„ .. .. single bag ..	0	3	6
Oven Tiles, 12 x 12 x 2in. .. .. .. each ..	0	1	9
Fire Lumps, Bakers' Ovens Sets, Colonial made—			
1 of 36 x 12 x 6in 1 of 32 x 12 x 6in. } .. .. .. net ..	2	10	0
3 of 18 x 12 x 6in.			
Equals 10ft. at 5/–.			
Best English Oven Sets	2	15	0

For quantities, *see Advt. pages,* 2 and 18.

CONTRACT PRICES OBTAINED.

	per rod. £	s.	d.
Brickwork, in mortar, including arches in cement, 3 to 1 ...	19	10	0
Ditto in cement	22	0	0
Brickwork in mortar, hollow walls and ties	20	0	0
Brickwork, in cement	22	10	0
Extra to above—			
Facing O.K. bricks, per square yard ... ... (or 67/6 per rod, 9in. work, extra).	0	1	6
Facing Double Pressed bricks, per square yard	0	4	6
Struck joints, per square yard	0	0	3
Tuck Pointing, new work, including coloring, per square yard	0	2	0
Ditto, old work, ditto, and raking out, per square yard ...	0	2	6
Galvanised iron bond, per cwt.	0	18	0

CARTAGE.

Wages at 14/- per day of 8 hours.

	s.	d.
Carting bricks, including loading and unloading, one mile per 1000, with 2-horse loads	7	6
Ditto, add for each mile beyond, per 1000	1	6
Ditto, with 1-horse drays, ditto	8	6
Ditto, for each extra mile	1	9
Carting slates, sand, lime, or rubbish, per load for one mile, including loading and unloading	3	0
Ditto, add for each mile beyond, per load	0	8
Carting scaffolding, per load, for one mile, including loading and unloading	3	6
Ditto, for each mile beyond first mile, per load ...	0	9

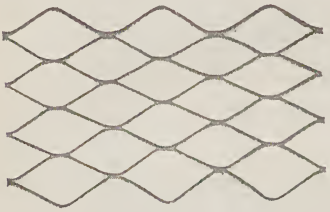
Contractors must allot a price per load that will allow of every carter to make at least 14/– per day.

Reinforced Brick in Cement Lintels over ordinary 3ft. door or window openings may be built in flat courses, with three layers of the special reinforcements of expanded metal "Exmet," or steel-wire-mesh "Brictor."

In all cases, with or without the reinforcement, a close heading joint must be kept in brickwork over openings, and a rigid support maintained till the cement has thoroughly set and dried.

BRICK-WORK REINFORCEMENTS.

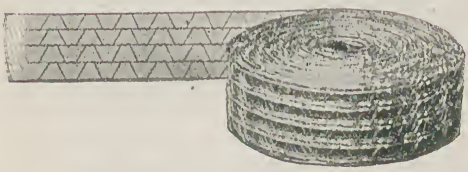
"**Exmet**" is an expanded steel production, consisting of a fine integral mesh, 20 to 24 gauge steel, similar to Plasterers' Lathings, in rolls 2½in. wide, dipped in Asphaltum paint.



Sold in Coils 270ft. long, from 12/- per Coil.

270ft. Coil.	lbs.
24-gauge	14
22-gauge	18
20-gauge	23

"**BRICTOR**" is a wire mesh reinforcement, made in Sydney and Melbourne, in rolls 75ft. long.



	Price per Roll.
1½ wide	... 4/-
2½ wide	... 5/-

It is also made 150 feet.

(*See agent's advt., pages* 6 *and* 11.)

Breeze and cement bricks to build wall in lieu of plugging can be made in long mould by hand mixing.

Labor and materials at 70/- per 1000 s. d.

Concrete Breeze Lintels, 6 x 4½, per foot run 1 0

Over 5ft., special quotations.

Manufacturers, Taylor & Co. (See advt., page 35.)

POINTING.

Labor and "All Materials," per yard super.

	s	d
With wheel flue in corner of building—		
Flat joint or white pointing, including raking out and scaffolding	1	6
Ditto, to chimney shaft, do. up to 50ft. high	2	6
Tuck pointing to new work and scaffolding	2	0
Ditto, to old work, including raking out, cleaning, staining and scaffolding	2	6
Strick joint	3	0

Per award rates, per square yard.

Coign work	1	8
Raking out old or struck work	0	3
Cleaning down walls, per 10ft. square	2	6
3ft. bull's eyes, each	5	0
Country work, per yard	2	3

Scaffold provided.

PAVING.

Labor, etc., per yard super.

32½ Bricks at 1/4½ per hour.	s. d. Lime or Cement.	s. d. Labour.
32 **Bricks** flat in sand, laid straight or herring-bone	0 3	0 9
41 ditto, on edge, in ditto	0 4	1 0
32 ditto, flat in mortar and jointed do.	0 7	1 3
41 ditto, on edge, do.	0 10	1 9
If laid flat in cement, add on mortar	0 4	0 4
Ditto, on the edge	0 5	0 10
8, 9, 10, or 12in. tiles, in mortar	3 6	1 6

Paving Material, per square yard—

Calculating Bricks at 50/- per 1000.

Add 1/8 on flat; 2/- on edge to above.

One bag cement, 8 cubic feet of sand, for grouting 6 yards.

Paving for water channels or open drains, add from one-fourth to one-half for extra labor.

MATERIALS REQUIRED TO BUILD BRICKWORK.

Ordinary Cottage Kitchen Chimney of the following dimensions :—

Fireplace, 3ft. 6in. wide x 18in. deep, with 9in. back and sides; 5ft. x 10ft. front, 16ft. to top of chimney, with foundation :—

	£	s.	d.
Bricks—1000 at 50/-	2	10	0
Lime—1½ bags at 5/-	0	7	6
Sand—1½ loads at 4/-	0	6	0
Cement—½ bag, 3/6; chimney-pot, 2/6	0	6	0
Scaffolding and labor to above	3	10	6
	£7	0	0

Usual Double Chimney, with 5ft. breasts, 10ft. high, 18ft. to top of double chimney :—

	£	s.	d.
Bricks—1500 at 50/-	2	10	0
Lime—2 at 5/-	0	10	0
Sand—2 loads at 4/-	0	8	0
Cement—½ bag, 3/6 ; 2 bars, 4/-	0	7	6
Scaffolding and labor to above	5	4	6
Net cost ..	£9	0	0

Kitchen Chimney, 6ft. wide overall at bottom, and bottle stack 14ft. high ; brick foundations overall 6ft. 9in. x 3ft. 9in. ; fireplace, 4ft. 6in. wide, 4ft. x 27in., 9in. back :—

	£	s.	d.
Bricks—900 at 50/-	2	5	0
Lime—1¼ bag at 5/-	0	6	3
Sand—1¼ load at 4/-	0	5	0
Scaffolding and labor	3	6	0
Net cost ..	£6	2	3

Ordinary Brick W.C., 4ft. 6in. x 3ft. 6in. x 8ft. high inside x 4½in walls :—

	£	s.	d.
Brickwork—750 at £5 per 1000 laid	3	15	0
Floor—Concrete, 2 yards at 6/-	0	12	0
Roof—Galvanised Iron, 3 7ft. sheets at 2/8 each	0	8	0
Rafters—Plates and fixing	0	16	0
1in. T. and G. ledge door, 12/- ; lock, 2/- ; louvrs, 6/- ; labor, 10/-	1	10	0
Pan, 5/- ; seat, 8/- ; fixing same, 5/-	0	18	0
Painting door and coloring walls	0	11	0
Net cost ..	£8	10	0
If walls are 9in. thick add	£2	0	0

Setting Washing Copper, with chimney 12ft. high :—

	£	s.	d.
Bricks required, 450 ; lime, ½ bag ; sand, ½ load	2	10	0
Labor to above about	1	10	0
	£4	0	0

Setting Washing Copper (see prices).—

With wheel flue in corner of building :— .. ..

	£	s.	d.
Bricks, 250, 12/6 ; lime, 1/6 ; sand, 3/5 ; and cement, 1/6	0	18	0
Labor to above about	0	12	0
	£1	10	0
Labor to above about	0	12	0
To both items add 12 gal. copper, door and grate about	1	0	0

CIRCULAR TANKS, WELLS, SHAFTS, OR CULVERTS.

Table showing earth to be removed, number of bricks (4 courses to 13 inches), and contents in gallons ; also cost at 60s. per cube yard for brickwork in cement (1 to 2), for each foot in depth.

	Half-brick Thick.			One Brick Thick.			
Clear diam. feet. in.	Earth cube ft.	Bricks, per foot.	Cost, at 60s. s. d.	Earth, cube ft.	Bricks, per foot	Cost. at 60s. s. d.	Gallons, per foot. in depth.
2·3	7	44	7 4	11	100	16 8	24·6
2·6	9	48	8 0	13	110	18 4	30·6
3·0	12	57	9 6	16	126	21 0	44·0
3·6	14½	65	10 10	20	142	23 8	61·0
4·0	18	73	12 2	24	158	26 4	73·3
4·6	22	82	13 1	28½	174	29 0	99·1
5·0	26	90	15 0	33½	190	31 8	122·3
5·6	31	98	16 4	38½	206	34 8	148·0
6 0	36	107	17 10	44½	222	37 0	176·2
6·6	41½	115	19 2	51	238	39 8	206·8
7·0	48	123	20 6	57	254	42 4	239·8
8·0	61	140	23 4	71	286	47 8	313·2
9·0	75	150	25 0	87	310	51 8	396·5
10·0	91	160	26 8	104	340	56 8	489·5

Semi-circular domes contain the same number of bricks as an equal height of the sides or barrel, *e.g* a semi-circular dome of 10 ft. diam. and one brick thick contains 340 x 5 = 1700 bricks.

The price given for tanks, &c., one brick thick, would include the excavation in earthwork at Sydney or Melbourne prices.

When calculating bricks by the above table, deduct one-tenth from number of bricks stated for ordinary machine bricks.

Current price per cubic yard to be ascertained, as per page, and the difference allowed for as per table, *e.g.*, if 50s., reduce one-sixth.

Square.—If brickwork was reckoned by the square the measurement and calculation would be greatly simplified.

Labour only.—Doorways and other openings are not deducted, except more than 36 super feet each when half the area is deducted for labour only.

Terms used.

"Lime (or cement) and mortar" includes scaffolding, centering, moulds, templates, and all materials except bricks.

"All materials" includes lime and mortar and bricks, when all openings are deducted in the measurement, and arches, &c., allowed for. This is the English and standard method.

Circular Tanks and Shafts.

Bevelled Bricks are sometimes used for small wells and tanks by which the labour of cutting the ends of the bricks is saved, and a finer joint obtained If built with half brick rim the inner face of 9 inch bricks will measure as follows, viz :—

Clear diam.		Clear diam.		Clear diam.	
Feet.	Inches.	Feet.	Inches	Feet.	Inches
$1\frac{1}{2}$	6	3	$7\frac{1}{4}$	$4\frac{1}{2}$	8
2	$6\frac{1}{2}$	$3\frac{1}{2}$	$7\frac{1}{2}$	5	$8\frac{1}{8}$
$2\frac{1}{2}$	7	4	$7\frac{3}{4}$	6	$8\frac{3}{8}$

Circular Tanks and Shafts.

Table showing earth to be removed, number of bricks (4 courses to 13 ins.), and contents in gallons for each foot in depth; also number of bricks in semi-oval domes, with rise equal to one quarter the span.

Clear diam. feet	One Brick Thick.			One and a-half Brick Thick.			Gallons each foot in depth
	Earth,	Number of Bricks.		Earth, &c	Number of Bricks.		
	cu. feet	Semi-oval dome.	Each foot in depth	cu. foot	Semi-oval dome.	Each foot in depth	
10	104	900	350	118	1490	540	409
11	123	1070	380	138	1770	590	594
12	144	1280	410	160	2090	640	706
13	164	1470	440	183	2390	690	831
14	184	1670	471	208	2700	740	962
15	214	1900	503	234	3100	790	1106
16	241	2160	535	262	3520	835	1256
17	269	2470	566	292	3980	885	1419
18	299	2780	597	323	4400	930	1589
19	331	3080	628	355	4880	975	1775
20	364	3400	650	389	5400	1025	1963

N.B.—The above domes are intended to be circular on plan and semi-oval in section, with man-hole in the centre. The 10 feet semi-oval dome requires only 900 bricks, while the semi-circular dome, of the same diameter, requires 1800 bricks. The brickwork of Sydney and Melbourne generally averages 10 bricks to the sup. foot, one brick thick. It will also be found that circular domes contain the same number of bricks as an equal height of the tank they cover provided they are of the same thickness.

Bricks and lime or cement will not properly combine unless the bricks are soaked with water immediately before being used. If this is done the work will never give way in the joints. A similar, but less effective result, may be obtained by watering dry walls before the mortar or cement is set, or partially so by grorting.

TABLE SHOWING THE NUMBER OF BRICKS REQUIRED FOR WALLS *of all areas at* 4,080 *bricks per reduced rod.*

Area of wall.	Bricks thick and bricks required.				
	½ brick.	1 brick.	1½ brick.	2 bricks.	2½ bricks.
1	5	10	15	20	25
2	10	20	30	40	50
3	15	30	45	60	75
4	20	40	60	80	100
5	25	50	75	100	125
6	30	60	90	120	150
7	35	70	105	140	175
8	40	80	120	160	200
9	45	90	135	180	225
10	50	100	150	200	250
20	100	200	300	400	500
30	150	300	450	600	750
40	200	400	600	800	1,000
50	250	500	750	1,000	1,250
60	300	600	900	1,200	1,500
70	350	700	1,050	1,400	1,750
80	400	800	1,200	1,600	2,000
90	450	900	1,350	1,800	2,250
100	500	1,000	1,500	2,000	2,500
200	1,000	2,000	3,000	4,000	5,000
300	1.500	3,000	4,500	6,000	7,500
400	2,000	4,000	6,000	8,000	10,000
500	2,500	5,000	7,500	10,000	12,500
600	3,000	6,000	9,000	12,000	15,000
700	3,500	7,000	10,500	14,000	17,000
800	4,000	8,000	12,000	16,000	20,000
900	4,500	9,000	13,500	18,000	22,500
1,000	5,000	10,000	15,000	20,000	25,000
2,000	10,000	20,000	30,000	40,000	50,000
3,000	15,000	30,000	45,000	60,000	75,000
4,000	20,000	40,000	60,000	80,000	100,000
5,000	25,000	50,000	75,000	100,000	125,000
6,000	30,000	70,000	90,000	120,000	150,000
7,000	35,000	70,000	105,000	140,000	175,000
8,000	40,000	80,000	120,000	160,000	200,000
9,000	45,000	90,000	135,000	180,000	225,000
10,000	50,000	100,000	150,000	200,000	250,000
20,000	100,000	200,000	300,000	400,000	500,000
30,000	150,000	300,000	450,000	600,000	750,000
40,000	200,000	400 000	600,000	800,000	1,000,000
50,000	250,000	500,000	750,000	1,000,000	1.250,000

Deduct one-tenth from above numbers for 3675 machine made bricks to the reduced rod.

Table showing the value from One, to Two Hundred and Seventy-two Feet of reduced Brick Work, from £3 to £12 per Rod.

Feet.	At £3 per Rod.			At £4 per Rod.			At £6 per Rod.			At £8 per Rod.			At £10 per Rod.			At £12 per Rod.		
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s	d.
1	0	0	2½	0	0	3½	0	0	5	0	0	7	0	0	9	0	0	10½
2	0	0	5	0	0	7	0	0	10½	0	1	2	0	1	5½	0	1	9
3	0	0	8	0	0	10½	0	1	4	0	1	9	0	2	2	0	2	7½
4	0	0	11	0	1	2	0	1	9	0	2	4	0	2	11	0	3	6
5	0	1	1	0	1	5½	0	2	2	0	2	11	0	3	8	0	4	5
6	0	1	4	0	1	9	0	2	8	0	3	6	0	4	5	0	5	3½
7	0	1	7	0	2	1	0	3	1	0	4	1	0	5	2	0	6	2
8	0	1	9	0	2	4	0	3	6	0	4	8½	0	5	10½	0	7	0½
9	0	2	0	0	2	8	0	3	11½	0	5	3½	0	6	7	0	7	11
10	0	2	3	0	2	11	0	4	5	0	5	10½	0	7	4	0	8	10
15	0	3	4	0	4	5	0	6	7	0	8	10	0	11	0	0	13	3
20	0	4	5	0	5	10½	0	8	10	0	11	9	0	14	8½	0	17	8
25	0	5	6	0	7	4	0	11	0	0	14	8½	0	18	4½	1	2	0½
30	0	6	7	0	8	10	0	13	3	0	17	8	1	2	1	1	6	6
40	0	8	10	0	11	9	0	17	8	1	3	6	1	9	5	1	15	3½
50	0	11	0	0	14	8½	1	2	1	1	9	5	1	16	9	2	4	1
60	0	13	3	0	17	8	1	6	5½	1	15	3½	2	4	1	2	12	11
70	0	15	5	1	0	7	1	10	10½	2	1	2	2	11	5½	3	1	9
80	0	17	8	1	3	6	1	15	3½	2	7	0½	2	18	10	3	10	7
90	0	19	10	1	6	5½	1	19	8½	2	12	11	3	6	2	3	19	5
100	1	2	1	1	9	5	2	4	1	2	18	10	3	13	6	4	8	2
110	1	4	3	1	12	4	2	8	6	3	4	8	4	0	10½	4	17	0½
120	1	6	6	1	15	3½	2	12	11	3	10	7	4	8	3	5	5	10½
130	1	8	8	1	18	3	2	17	4	3	16	5½	4	15	7	5	14	8½
140	1	10	11	2	1	2	3	1	9	4	2	4	5	2	11	6	3	6
150	1	13	1	2	4	1	3	6	2	4	8	3	5	10	3½	6	12	4
160	1	15	4	2	7	0½	3	10	7	4	14	1	5	17	8	7	1	2
170	1	17	6	2	10	0	3	15	0	5	0	0	6	5	0	7	10	0
180	1	19	9	2	12	11	3	19	5	5	5	10½	6	12	4	7	18	10
190	2	1	11	2	15	10½	4	3	10	5	11	9	6	19	8	8	7	8
200	2	4	1	2	18	10	4	8	3	5	17	8	7	7	0½	8	16	5½
210	2	6	4	3	1	9	4	12	8	6	3	6	7	14	5	9	5	3½
220	2	8	6	3	4	8½	4	17	0½	6	9	5	8	1	9	9	14	1
230	2	10	9	3	7	8	5	1	5½	6	15	3½	8	9	1	10	2	11
240	2	12	11	3	10	7	5	5	10½	7	1	2	8	16	5½	10	11	9
250	2	15	2	3	13	6	5	10	3½	7	7	0½	9	3	10	11	0	7
260	2	17	4	3	16	5½	5	14	8½	7	12	11	9	11	2	11	9	5
270	2	19	7	3	19	5	5	19	1½	7	18	10	9	18	6	11	18	3
272	3	0	0	4	0	0	6	0	0	8	0	0	10	0	0	12	0	0

By adding, halving, or doubling, as may be requisite, any quantity or value can be obtained from the above Table.

CARPENTER.

MEASUREMENT.

Timber is generally measured by the 100 feet super.

The superior kinds, such as cedar, mahogany, rosewood, Tasmanian blackwood, veneers, &c., by the super foot.

The labour is by the 100 feet square of piecework such as studs, battens, shingle, T. and G. and other partitions, joisting and flooring, framing, roofing, and ceiling, weatherboards.

It will be a saving of time when estimating to form cost price per square (locally), including allowance for waste on lengths.

Round timbers, for **woolsheds, stockyards**, corner posts, telegraph poles, by the piece.

Bridge and small wharf piles are by the pole or single piece.

Larger piles, over a foot in diameter, struts and beams, by cube foot.

Ceiling, slate, and wall battenings, by the 100 square feet, viz., 10ft. x 10ft.

See Quantities and Measurements, page 17.

N.B.—The whole of the foregoing items in Carpentry and Joinery are cast out at 15d. per hour, with deal at 4d. per super foot, 1in. thick, and are about the cost price for ordinary work under the most favourable circumstances.

In estimating, at 1/4½ per hour, add one-tenth, at 1/6 per hour add one-fifth to the labour, and at least 10 per cent. on the whole cost for incidental expenses besides profit.

RULES FOR MEASUREMENT.

Circular work of every description in Joinery to be charged as follows, viz. :—

Flat sweep, not more than ½-inch rise per foot, or curves of circles not less than 3 feet diameter, once and a-half the price of straight work.

Quick sweep, or more than ½-inch rise per 12-inch chord, twice the price of similar straight work.

Elliptical, the same, according to sharpness of the curves.

The above proportions apply to the shape on the plan, or to the elevation only.

If they occur on both plan and elevation as circular circular, they must be reckoned twice or three times the price of circular on plan only, *e.g.*, if flat sweep on both plan and elevation, the proportion would be 1½ x 2 = 3 times the price of straight work.

If quick sweep on both plan and elevation, the proportion would be 2 x 3 = 6 times the price of similar straight work.

If flat sweep on plan and quick in elevation, 4½ times.

If quick sweep on plan, and flat in elevation, 4 times the price of similar straight work.

MEASUREMENT—CARPENTER & JOINER.

Circular sashes, frames, shutters, &c., to be measured square, and circular heads to doors, &c., to be measured square above the springing, which gives an addition of 21½ per cent. on the net measurement, exclusive of the extra charge determined by the previous Rules.

Circular, plain glued in thickness, for all degrees of curvature take twice the price of similar straight solid work, and if circular circular, from 3 to 4 times, according to sharpness of curves.

Cornices.—In measuring cornices the mouldings do not include the splay of weathering, which is to be taken as boarding, wrought, &c., as the case may be.

THE COST OF LABOUR TO JOINERY—comparative.

Taking **deal** or **clear pine** as a standard—

"**Joinery**" Oregon, fine grain, picked, 10 per cent. more than clear pine.

Oregon (stock) and cyprus pine, 15 per cent. more.

Cedar, Huon Pine, &c., is about 25 per cent.

Tasmanian Blackwood, Queensland Maple, is 35 per cent. more than clear pine.

Oak, **American Walnut, Teak, Japanese Oak** 35 to 50 per cent.

Jarrah, Aus. Hardwoods, and Ironbark, from 50 per cent. to 75 per cent.

RAILWAY SLEEPERS.

The best sleepers are those made from seasoned blue or red gum, ironbark, blackwood, or box. The trees should be barked and allowed to die before they are felled, by which means they become partly seasoned; the season for falling Australian timber is from March to September, when the sap falls; it should then be split or sawn and stacked in the shade in such a manner that it may be *well ventilated*; but with every precaution, the ends will open more or less; this may be partly stayed by bolting them. It would be worse than useless to tar unseasoned timber, which would only hasten its decay by preventing the sap evaporating. These remarks apply to all kinds of Australian timber and for all purposes. *Floor timbers* and boards should be stacked and seasoned in the shade, with thin separating fillets between boards to admit air.

MEMORANDUM.

Hardwood Timber.—In choosing trees for sawn timber, posts, slabs, &c., avoid those with dead branches, which are often an indication of decay when the trees otherwise appear sound. The best wood is always found in full-grown trees, upon dry soils or slopes.

In **Splitting** ironbark, the slabs, posts, &c., are split parallel with the rings, and generally thin out towards the top, but in stringy bark the slabs are generally split in radiating lines from the centre outwards, and in this manner have been split 2ft. wide by 5ft. long.

BUSHWORK—SLEEPER GETTERS.

Prices in N.S.W. Association.

Ironbark, 9 feet long, regulation size, 4/6 each ; 8 feet long, 3/9 each.
Box or gum, 9 feet long, regulation size, 4/2 each ; 8 feet long, 3/5 each.

Sawn Sleepers—Labor and getting.

9ft. x 9in. x 4½in. each sleeper average.

	s.	d.	s.	d.
Falling, barking, and trimming trees	0	8		
Removing logs to saw pits, within half a mile ..	0	6		
Squaring and preparing timber for sawyers, and sawing complete	1	0		
Removing from pit and stacking	0	4		
Cost price per sleeper near pit as above, average ..			2	6

Additional Cost—Transport to railway 2 miles away.

Loading, cartage, and unloading, for first mile ..	0	6		
Add for each additional mile	0	3		
Boring sleeper, 9 inches wide, at both ends ..	0	4		
Riveting sleeper, with ½in. iron rivets	0	3		
Removing from heap and re-stacking	0	4		
Add the cost of the two dog bolts and washers, about 1½lbs., also profit on the whole net cost, as above, for Box or Gum			1	8
			4	2
Adzing sleepers for permanent way, per 100 ..	18	6		

The above sleepers average about 14 to the ton.
Red gum, ironbark and box sleepers last from 12 to 15 years.
Messmate and stringy bark sleepers last only 5 or 6 years.

LABOUR ONLY.

Split Slabs, Posts and Rails.

Per 100 count.

Felling, sawing and splitting ironbark slabs, 5½ft. x 11½in. x 1½in.	15	0
Ditto, stringy bark slabs, ditto	11	0
Ditto, slabs, 3½ft. x 11in. x 1½in.	7	6
Ditto, ironbark slabs	11	0

Getting Posts and Rails.

Stringy bark or gum, 7ft. x 9in. x 4in., and rails 9ft. x 6in. x 3in.	25	0
Felling, sawing, and splitting hardwood posts and rails (as per last item), for 3-rail fencing, at per rod	2	0

Fencing, per rod, labor only, 3/- to 4/-

Cartage of 25 posts and 75 rails (scantling as above, weighing 3 tons) for first mile, including loading and unloading, by bullock team	5	0
Ditto, for each additional mile .. ,, ,, ...	1	6

ROUGH TIMBER BRIDGES.

Labour in bush.

Hardwood.	s.	d.
Felling, trimming, and barking gum or box, for piles, bearers, struts, &c., from 15 to 18 inches diameter, and from 20 to 40 feet long, per lin. foot	0	10
Rough adzing and squaring ditto, ditto	0	9
Pile-driving in clay, sand, loose gravel, &c., ditto	1	9
Hoisting, framing, fixing, bolting, &c., ditto	1	6
The above complete, per lineal foot	5	0
Sawn planking, railings, guard rails, &c., fixed and bolted, complete .. .. per cube foot	4	0
Wrought hand-rails, &c., framed and fixed, complete, per cube ft.	6	0
Add bolts, straps, &c., per lb., from .. .. 3d. to	0	5

Example—Planking, 3in. thick, per square, viz., 10 feet x 10 feet.

	per 100	s.	ft. s.	d.
11 planks at 10ft. x 9in. x 3in. = 250 sq. ft. at 25/– = per 100 ..		62		6
Labor, laying, per square = ...		22		6
6 spikes to each plank = 88 count of 7in. spikes (*refer to Smith's table*) = 33lbs. at 22/– per cwt.		6		0
Waste and incidentals, 10 per cent.		9		0
per square	100	0		
As four thicknesses of 3in. planking would be one foot thick, 100 cubic feet would cost 400/–, or one cubic foot (*as per above table*) net cost		4		0

H.W. WHARFS, JETTYS, BRIDGES, PILING, GIRDERS AND PLANKING.

First-class Construction.	s.	d.
Hardwood round piles (vertical), from 20 to 40 feet long, driven complete, per lin. foot	4	6
Ditto, raking ditto, or vertical sheet piling, per lin. foot ..	5	6
If in shallow water, or if more than 40ft. long, add	1	6
Labor in pile driving, including staging, &c., per lineal foot, from 1/6 to	2	6
Hardwood, sawn sided, bolted and fixed in walings, braces, collars, struts, straining pieces, corbels, girders or joists, per cube foot	5	0
Hardwood, wrought, framed, and chamfered in stanchions, sills, diagonal braces, hand-rails, &c.	7	0
Hardwood, rough, wrought and splayed, in guards, fenders, &c., per cubic foot	6	0
Hardwood 4in. planking, in roadway, &c., laid and spiked, 3/9 ; 3in. ditto, per cubic foot	4	0
Ditto, 2in., ditto in footways, &c., ditto	5	0

The above items include the fixing only of all ironwork, in piles, &c. ; also hardwood within 2 miles.

Ironbark Piles from 20 to 50 feet long, and 12 to 18in. diameter per lineal foot, in Darling Harbour, Sydney, from 2/– to 2/6.

Laminated bridge of 70ft. span and 16ft. wide, 4 arched ribs each, with four 10 x 4 planks on raking piles, etc., for springing, cost about £7 per lineal foot, and large strutted bridges about £10 per lineal foot complete.

Mortising posts, adzing rails, sinking holes, and putting up 3-rail fence, complete		3	6
Nailing 5ft. (*narrow spaced*) paling on ditto		0	9
Ditto, wide (*close paling*), 6 nails each, on ditto		1	0
Labor		5	3

Number of Nails in a 7lb. packet—
1000 nails in 7lb. packet, 1¾ x 11 gauge.
4 packets = 12 squares
360 nails required for nailing 1 square flooring boards, 6 x 1, T. & G.

Example—Split Paling Fence.

5ft. high, split posts and 2 rails.

Supplied from timber merchants, Sydney.

2 Split Posts, 8ft., 1/9 each		3	6
50 Palings at 24/– per 100		12	0
2 Rails, 9ft., at 1/6 each		3	0
Hoop Iron, 1/–, nails, 6d.		1	6
		20	0
Labor per rod		4	0
Net		24	0

RAILWAY BUFFER FRAMES.

For "dead ends" of tracks.

	s.	d.
Hardwood curbing, uprights, heads, sills, struts, sleepers, &c., framed, housed and bolted, labor only, at per cub. ft.	3	0

Iron work to be charged by the pound.

RAILWAY GATES, N.S. WALES.

For level crossings, per cubic foot.

	£	s.	d.
10 or 12 feet gates, Baltic deal, wrought, framed, tapered and stop chamfered	0	12	6
Hardwood wrought in posts, struts, guard rail, &c.	0	7	3
10 feet gates, including hardwood, deal, ironwork, painting and hanging complete, about	40	0	0
12 feet gates, ditto, ditto ditto	47	0	0

HARDWOOD GIRDERS.

Hardwood Girders—Mill Prices per 100ft. super.

	s.	d.
Heavy Scantling, 4in. to 6in. x 12in.	25	0
Tallowwood, ditto, 28/–; Spotted gum, ditto	26	0
H.W. Deck Planking, 2½in., 3in., 4in. thick, to 12in. wide	25	0
Oregon Girders, up to 30ft. long.		
15in. x 15in. and over, up to 18in. x 18in., per 100 sq. ft.	21	0
12in. x 12in. up to 15in. x 15in.	19	0
Planking and Heavy Scantlings, from 2in. thick to 12in. x 12in.	18	0
Dressing above, extra	4	0

MACHINE DRESSING AND TURNING HARDWOOD BEAMS.

	s.	d.
H.W. Beams, Posts, per 100 sq. feet extra	4	0
Dressing Heavy H.W. Storey Posts.		
Not less than 10ft , 12in x 12in. or over, per cubic foot	0	9
Dressing under 12in. x 12in., per foot run	0	9
Turning H.W. Storey Posts.		
For Stores, Warehouses, &c.		
Posts 10ft. long and over, size 12in. x 12in. or over, per cub. ft.	1	6
Ditto, under 12 x 12	2	0

Turned Telephone or Telegraph Poles.

(Tapered 30ft. 10in. to 6in., 40 feet long.)

Bottom, 10ft. dressed 10in. octagon, from £3 each.

For special quotations apply "Hudson" Pole Co., Pyrmont, Sydney.

Machine Dressing, general mill price: Pine, per 100 super 2 6

LABOR TO PINE IN SCANTLINGS.

	Per 100 s. ft. s.	d.
Beams, breast-summers, wall-plates, pole-plates, lintels, templates, wood-bricks, sleepers, &c.	4	10
Framing rough ordinary scantlings	9	0
Ditto, wrought by hand	13	0
Ditto, ditto, and stop chamfered	14	6
Ditto, ditto, and rebated	16	8
Ditto, ditto, ditto, and beaded	18	0
Wrought, rebated and beaded door and window frames, with sunk and weathered hardwood sills	25	0
Joists, ground, ceiling-floor, or ceiling joists, notched or housed and spiked	4/– to 7	0
Ditto, framed to binding joists, girders, &c.	8	4
Ditto, single-framed floors, trimmed to well holes, chimneys, &c.	9	0
Add for each storey above ground floor	0	8
Partitions, 3in. x 2in., framed	10	6
Ditto, 4 or 5 x 3	8	6
If braced, add for each side	0	8
Ditto, trussed with king posts, add	2	0
Ditto, with king and queen, add	2	9

N.B.—If in hardwood add from 10 to 20 per cent.

N.B.—The prices given in Carpentry and Joinery are for hand labor at 1/4½ per hour to deal or pine, unless otherwise mentioned.

At 1/6 per hour wages, add one eleventh (1/11th) to labor items.

JOISTS AND RAFTERS, FLOORS AND ROOFS.

Labor per square of 100-super feet.

Naked Framed Floors, including nails.

Wages, 1/6 per hour.

Spaced 18in.	Material used. Inches.	Labour and Nails Net. s.	d.
H.W. Ground joists and plates, bedded, level, not framed	5 x 2½	3	3
Ditto and 1st floor, notched on to plates and girders	6 x 2½	4	0
Ditto, framed to chimneys and well-holes	6 x 3	5	3
Ditto, common ceiling joists, notched on to plates	4 x 2½	3	6
Spaced 18in. Oregon floor joists, 9 x 3 and 12 x 3,	5/3 to	5	9
H.W. Intermediate Trimmers to well-holes, &c.		7	6
Pine herring-bone strutting, per foot run	2 x 2	0	3
Labor, laying **Flooring boards,** per square, from	3/– to	5	6
Ditto, secret nailed	5/– to	6	6

ROOFS.

Labor, per square.

		s.	d.
Spaced 18in. common shed or lean-to roof, for slates or tiles	4 x 2	3	0
3-feet ditto, ditto, for galv. iron	4 x 2½	1	9
Two-storey gable roof, cut to ridge, pole or wall-plates	4 x 2½	4	0
Ditto, if bevels cut at mills, reckon fixing only		2	3
Ditto, hips and valleys		5	9
Ditto, levelling, cutting in pole plates, 2in. x 2in. H.W., per foot run		0	3
For more than 2-storey, add for hauling material and scaffolding, per square		1	0

ROOF—CONSTANTS FOR ASCERTAINING THE LENGTH OF RAFTERS AND HIPS.

The Half-Span being Unity, or 1.

	Slope.	Angle of Rafter.	Angle of Hip.	Length of Rafter.	Length of Hip.	Height of Roof.
		deg. min.	deg. min.			
Rise $\frac{1}{8}$ span...	4 to 1	14.	10.2	1.031	1.437	.250
,, $\frac{1}{6}$,, ...	3 to 1	18.26	13.15	1.054	1.452	.333
,, 1-5 ,, ...	$2\frac{1}{2}$ to 1	21.49	15.47	1.077	1.469	.400
,, $\frac{1}{4}$,, ...	2 to 1	26.34	19.27	1.118	1.500	.500
,, $\frac{1}{3}$,, ...	$1\frac{1}{2}$ to 1	33.42	25.14	1.202	1.563	.667
Square roof ...	1 to 1	45.	35.16	1.414	1.732	1.000
Rise $\frac{2}{3}$ span...	$\frac{3}{4}$ to 1	53.8	43.19	1.667	1.943	1.333
,, $\frac{3}{4}$,, ...	$\frac{2}{3}$ to 1	56.19	46.41	1.803	2.062	1.500
Gothic roof ...		60.	50.56	2.000	2.236	1.732
Rise = span ...	$\frac{1}{2}$ to 1	63.27	54.44	2.237	2.449	2.000

Roofs.—To obtain the length of the rafter and hip of a square roof, with a pitch of 1 to 1, from the above table. Assuming the half span to be 13ft., then the rafter will be = 1.414 x 13 = 18.38, or 18ft. $4\frac{5}{8}$ins., the hip rafter being 1.732 x 13 = 22.52 = 22ft. $6\frac{1}{4}$in.

ROOFING.—LABOUR AND NAILS AT 1/4½ PER HOUR. CUTTING, BORING & FIXING OREGON.

	per 100
Single span or valley roof over ground floor	9 7
Ditto, for every extra floor, add	0 $9\frac{1}{2}$
Girders, binders, struts, angle ties, and **curb roofing,** with pole plates, and rafters	9 6
King truss roof, with purlins, &c.	14 3
Queen truss roof, from 30 to 45 feet span, with purlins, &c., over ground floor	16 9
Framed roofing, from 45 to 60 feet span, with principals, king and queen posts, struts and purlins, over ground floors ..	19 0
Ditto, if higher, add per storey	0 9

Ironwork, king bolts, stirrups, straps, &c., per lb., fixed, 6d.

Laminated semi-circular roof trusses, wrought all sides, painted before being put together, and nailed in thicknesses is worth from 50 to 70 per cent. more than for similar solid framing.

Laminated semi-oval roof trusses, similarly treated, from 70 to 100 per cent. more than for solid framing.

Equilateral Gothic Oregon truss, 43 feet span, principals 12 x 6 ; tie beams 10 x 5, with hammer beams, wrought below collar ties, stop chamfered and fitted ; cost price per truss, about £6. Raising the above with four men, derrick, &c., about 15/–.

If of H.W. timber, add 15 to 25 per cent. on the roof items for labour.

FLOOR-LAYERS PIECEWORK AWARD (May, 1911).

	per square. s. d.		s. d.
Warehouses and Stores—Pine, 4 x 1, from ..	2 9	to	3 0
Ditto, ditto—Hardwood, 4 x 1	3 9	to	4 0
Villas and Residences, not under one square, 4 x 1 pine	3 0	to	3 6
Floor-laying, secret nailed, 4 x 1, pine ..	5 0	H.W.	5 9
Ditto, 6 x 1, faced nailed	2 9	H.W.	3 3

Ditto, pine, 3 x 1, faced nailed, 4/–; secret nailed, 5/9; 2½ x 1, faced one nail, 4/6; secret nailed, 6/3; H.W. extras, per square, 1/6.

Examples in Estimating Cottage Flooring and Joisting,

Per square, 10ft. x 10ft.

Example No. 1.	p. lin. ft.	£	s	d
H.W. Plate, 3 x 1, — 2/1020ft run ..	3/6 —	0	0	9
Centre Bearer, 4 x 3, 1/10 —10ft. run ..	19/6 —	0	2	0
H.W. Joists, 4 x 2, 7/10 —70ft. run ..	15/0 —	0	10	0
Flooring, 6 x 1, T. & G. Baltic —110ft. run	24/0 —	1	6	6
Labor, laying joists, bedding plates and nails, 6d.	3/– to	0	4	0
Labor, laying flooring	3/6 —	0	4	3
Add for profit, &c. Net cost		£2	8	0

FLOORING AND JOISTING, per square.

Example No. 2.	per 100.	£	s	d
H.W. Plates, 3 x 2, 2/10 — 20ft. run @	6/6 —	0	2	9
Centre Bearer, 5 x 3, 1/10 — 10ft. run ..	22/6 —	0	2	3
H.W. Joists, 6 x 2, 7/10 — 70ft. run ..	20/0 —	0	14	0
Floorboards, 4 x 1, T. & G., plus 10 per cent. waste Baltic — 110 sup.	24/0 —	1	6	6
Labor—Joisting, 5/-; flooring, 4/–; nails, 1/9;		0	10	9
Add profit and waste, &c. Net		£2	16	0

FIRST FLOOR.

Example No. 3.			
Oregon Joisting, built in 9 x 2 — 7/10 — 125 s. ft., 19/–	1	3	9
Floor Boards, 4 x 1, T. & G. kauri, plus 10 per cent. waste — 110 sq. ft. at 32/–	1	15	3
Labor, joists, joisting, per square, 5/–	0	5	0
Labor, laying floor, per square, 3/6	0	4	0
Nails 1/9, waste 10 per cent. — 4/3	0	6	0
Net	£3	14	0

FLAT ROOFS.

Example No. 4.	£	s	d.
7 10fts. 5 x 2, H.W. Joists — 70, at 20/– per 100 ..	0	14	0
4 x 1, T. & G.	1	3	0
Laying Joists to slope	0	7	6
Laying Floor Boards	0	5	6
Vulcanite and laying	1	10	0
Add profit, waste, haulage, &c. Net	£4	0	0

BRACKETING (*including Plugging, Labor and Nails*).

	per sup. ft.
Common Cornices or Coves, 1½in. deal, measuring where lathed	0 6
Coved headed ceilings, passages, &c., measuring where lathed	0 3½
Groined ceilings in halls ditto	0 10
Gutters, 1in. and 1¼in. deal and bearers	0 6
Ditto, to curb roof, add	0 2
Ditto, if curved on plan, add .. .. from 2d. to	0 4

CENTERING.

Centering for gauged arches, or culverts	0 6
Ditto, small groined arches	0 11
Common centering on 3in. ribs, with inch battens for vaults and large culverts	0 5
Heavy centering, for arches, 15 to 30 feet span	0 8½
Centering for concentric segmental (circular circular) arches of brickwork or coke concrete, 16 to 20 feet span, springing from circular iron girders on piers for covered reservoirs,&c., the centering being formed on trussed ribs (radiating in plan) from 3 to 5 feet apart, and covered with colonial pine laggings, 1½in. to 1½in. ..	0 10½

N.B.—If the cost of centering is included in the price of brickwork, stonework, sign, etc., the arches, &c., should be taken separately, or the openings not deducted.

If the same center is used for more than one opening, the setting and striking only should be reckoned and one-half the cost of the centre.

LATTICE.

Rough Lattice Fencing, 3ft. high, with continuous laths, 1½ x ¼ laths, on 3 x 1 H.W. battens top and bottom, in 8ft. spans, 3ft. high, unpainted, per foot run 1 6

LATTICE.

Material only

	per 100ft. run
1½ x ¼, rough	2 9
1 x ¼, Oregon, dressed	3 3
1⅜ x ⅜	3 6
1½ x ¼, Redwood, dressed	4 6
Lattice Work, ordered sizes, from, per ft. surface	0 4½

Garden Expanding Lattice, 3in. mesh, ready made. 12ft. long, from 1ft. to 7ft. wide, price from 2d. to 2½d. per square foot.

EXAMPLES FENCING, VARIOUS, per foot run.

Labor, 11s. per day.

4ft. Fence, Cottage Fence.

	H.	W.
No. 1 *Example*—		
Mahogany Picket, D. and C., 4in. x ⅞in. at 9/– per 100ft. run.		
H.W. posts, 7ft. x 5in. x 3in., at 22/6 per 100 s. ft.; two dressed rails, 3 x 2, 9/6 per 100ft. run		
Material, 1/9; labor and nails, 1/– per foot run	2	9
Painting rails, posts, oiling pickets	1	0
Net cost, per ft. run	3	9
40 feet of above fence and gate, cost about £9 complete.		
No. 2 *Example*—		
4ft. 6in. H.W. Picket Fence, posts 8ft. x 5in. x 5in., cut tops, two arris rails, 4 x 4, ornamental pickets, Materials, 2/9, labor, 1/–; painting, 1/–	4	0

Dressed Picket Fence, 5ft.

No. 3 *Example*—		
Cut plain, 5 posts, 7ft. x 4in. x 4in. H.W., 2 rails, 4 x 2 H.W.	5	0
No. 4 *Example*—		
2ft. 6in. **Close d.d. and beaded Mahogany W.B.**, two 4 x 4 arris rails	3	0
2ft. of stonework, 9in. wide, dressed top at 1/6 per cubic ft.	3	0
Net	6	0
No. 5 *Example*—		
5ft. 6in. **3-rail Capped Fence**, D. & C. Mahogany Pickets, on H.W. 5 x 2 sill, 5 x 3 posts, including gate to match, painted	8	0
Plain Rubble Walls, under 9in. x 12in. deep, per ft. run ..	1	0
Sandstone Concrete Walls at 5/– per sq. yard., 6in. thick by every 12in. deep	0	6

ESTIMATE SAWN HARDWOOD FENCING—Close Paling.

per rod of 16ft. 6in.

No. 6 *Example*—		
2 rails, 16 x 3 x 2 = 32ft., at 19/– per 100	6	4
2 posts, 8 x 6 x 2½ft = 20ft. at 20/– per 100	4	0
45 palings, 6ft., at 24/– per 100 (4½in. wide x ½in. space) .. (See Table of Spacing.)	11	0
Nails, 6d.; and iron hoops, 2 rows	2	8
Labor, per rod .. .. 3/6 to	4	0
	28	0
Per foot run, about	1	9
Add for 3ft. wide gates, hanging complete, from 20/– to 30/– each.		

ESTIMATE OF H.W. WEATHERBOARD FENCING.

Per rod of 16in. x 6in.

	s.	d.
2 posts 9ft. x 6in. x 2in. — 18 s. ft. 2 rails 16.6 x 4 x 2 — 24 s. ft. Struts and sills, every other post — 10 s.f. — 52 s.f. at 20/–	10	6
32 Weatherboards, 6ft. x 7in. x 1in. — 112 s.f. at 25/– ..	28	0
Add 10 per cent. waste	2	0
Labor and nails, per rod	7	6
Equals about 3/– per foot run — net ..	48	0
If painted add 3 coats painting, 33ft. x 6ft. (both sides).		
198 s. ft. — 22 sq. yds. at 1/3 per sq. yd. .. .. .. (*See Painter.*)	27	6
	75	6

Cost, painted complete, 4/7 per foot run, net.
If rounded tops, 32 at 1d. each board — extra on rod .. 2 8

6ft. GAL. COR. IRON FENCE.

Similar scantling to last Example.

	per rod s.	d.
Timber only	10	6
Labor to fence woodwork	6	4
Eight and a-half sheets, 6 gal. iron, at 2/8	22	8
Labor to gal. iron, about 100 s. ft.	3	6
Nails, screws and washers	2	0
	45	0
If timber only painted, add	7	0
Net cost	52	0
Add for profit, incidentals and waste, 20 per cent. ..	13	0
	65	0

About 3/6 per foot run. Contract price from 4/– per foot run.

HEAVY H.W. STEPS—DRESSED AND FIXED.

	£	s.	d.
Flight of 38 treads, 12in. x 3in., nosed steps, 4ft. wide, 30ft. close strings, 12in. x 3, housed and bolted—			
Labor only—2 carpenters 52 hours — 1 man 104 hours at 1/4½	7	3	0
150 super feet Hardwood and Oregon, at 20/– per 100 s.f.	1	10	0
— about 4/9 per step	£8	13	0

COTTAGE, H.W. STEPS.

	£	s.	d.
Flight of 14 treads, 12in. x 2in., nosed steps, 4ft. wide, close strings, 12in. x 2in. H.W. at 20/–; labor at 11/– day; material, 160 s. ft. at 20/– per 100 —	1	14	0
Labour, 26 hrs. at 1/4½ and nails, ...	1	16	0
Net cost	£3	10	0

At 14 treads — 5/– per step.

VARIOUS WEATHERBOARD WALLS,
Covering only net cost., per square.

	Material, per 100.	Labor, per Square.	Net.
Weatherboards, Baltic, 7in. chamefered, ..	17/–	5/6	22/–
Weatherboard Hardwood, 7in. dressed, splayed	22/–	7/–	29/–
Mahogany Rustic, dressed, 9 x 1	28/–	8/–	36/–
Oregon, Rustic, 9 x 1	25/–	6/6	31/6
Redwood, Rustic, 9 x 1	31/–	6/–	37/–

Add for studding incidentals, profit, &c., to above.

GANTRIES (Labour only).

	Per 100 s. ft. s. d.
Framework for steam building whips, light timbers	20 0
Gantry for travelling crane, braced, strutted, and bolted together, not more than 40 feet high (Oregon pine), heavy timbers	12 6
Add for every 10 feet extra height	0 8

Travelling crane (Oregon) trussed with iron tie rods, bars, &c., about double these prices, including hoisting.

Labor in fixing and hoisting ironwork, including wheels and axles to ditto, per lb., 1d.

The bolts, dog-irons, &c., will not exceed 8lb. per 100 super foot.

TRIPOD GANTRY TOWERS FOR STATIONERY STEAM DERRICK CRANE.

(According to Municipal Regulations for Scaffolding.—See Index.)

MATERIALS.

For a 50 Feet Tower to lift 5 to 10 tons.

6ft. x 6ft., braced and bolted legs, in 10ft. bays, and 50ft. span.

	Lin. ft.	Inches.	sup. ft.
Corner posts, 12 of 50ft. each	600	7 x 7	24.54
Corner rails, 72 of 6ft.	432	5 x 3	5.40
Diag. braces, 120 of 15ft.	1800	7 x 3	31.50
Sleepers and plates, 12 of 8ft.	96	9 x 9	648
Centre posts, 3 of 50ft.	150	10 x 10	1259
Side ties joining legs, 9 of 50ft.	450	9 x 3	1012
Side braces, 12 of 80ft.	960	7 x 3	1680
Fish plates, 80 of 6ft.	480	7 x 3	840
Top plates, 3 of 60	180	10 x 10	1500
			13083
10 per cent. waste			1308
			14391

Labor to above, per 100 super feet 12/–

For every 10 feet higher, add one-fifth for extra materials and labor in hauling.

Top platform to be added—**Bolts and Iron Straps** for 50 feet, about 70cwt.

Raising and fixing 7-ton steam derrick crane on to 50ft. derrick, in position ; labor from £20.

Price of Crane.—See Electrical.

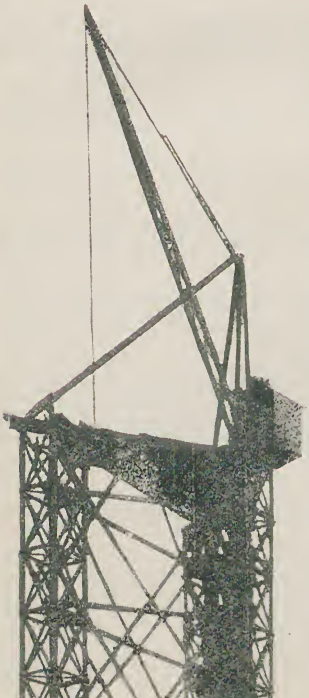
Weighting material, use of small accessory crane for raising and striking to be added.

EXAMPLE.—BRACED TIMBER TOWER.

50ft. x 10ft. x 10ft.

FOR CONCRETE FLUME DISTRIBUTOR.

	Oregon su. ft.
4 Corner Standards, 9in. x 2in. and 7in. x 2in., forming single post 9ft. x 9in.	534
32 bearers, averaging 10ft. 6in. x 2in., 8 bearers each side 8ft. apart	320
56 single braces, 12ft 4 x 2—14 each side	448
Planks for platform, 1 square, 3in. thick	250
	1552



	£ s d.
1600, reckoning Oregon 18/–, labor fixing 18/- per 100	28 16 0
120 bolts, $4\frac{1}{2}$ x $\frac{5}{8}$, square heads, 20 bolts 10 x $\frac{1}{2}$ (see Blacksmith) = $1\frac{1}{4}$ cwt.	1 10 0
	30 16 0
Erecting same on site	4 14 0
Net	£35 10 0

Every 10ft. extra reckon in proportion.

ANGLE IRON DERRICK.

3in. angle iron, 50ft. x 8ft. x 8ft., braced tower, 25/– per foot.—See Smith.

450ft. 4ft. x $\frac{1}{2}$ = 12.7lbs. per foot	5715lbs.
600ft. 2in. x 2in. x $\frac{1}{4}$ = 3.16lbs. per foot	1896lbs.
£1 per foot in height	7615lbs.
76 x 5lbs.	£51
Standards, 4in. x 4in. angle iron x $\frac{1}{2}$in. thick, 450ft. 12.7lbs. per ft.	5715lbs.
Braces and ties, 2 x 2 x $\frac{1}{4}$ = 600ft., 3.16lbs. per ft. =	1896lbs.
	7611lbs.

68cwt. at 15/– per cwt = £51, or about £1 per foot in height.

For lighter scantling of angle iron.—See Tablesmith.

See Steel Tank Stands, Windmill Standards.

See Artesian Wells for tapered Steel Derricks.

TIMBER MERCHANTS' TABLE OF BOARDS.

To Find the Superficial Contents of **One inch Boards** of different widths.

Boards. Size in inches.	Length of Board in Feet.															
	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
3 ..	1.3	1.6	1.9	2.0	2.3	2.6	2.9	3.	3.3	3.6	3.9	4.0	4.3	4.6	4. 9	5.0
4 ..	1.8	2.0	2.4	2.8	3.0	3.4	3.8	4.	4.4	4.8	5.0	5.4	5.8	6.0	6.4	6.8
5 ..	2.1	2.6	2.11	3.4	3.9	4.2	4.7	5.	5.5	5.10	6.3	6.8	7.1	7.6	7.11	8.4
6 ..	2.6	3.0	3.6	4.0	4.6	5.0	5.6	6.	6.6	7.0	7.6	8.0	8.6	9.0	9.6	10.0
7 ..	2.11	3.6	4.1	4.8	5.3	5.10	6.5	7.	7.7	8.2	8.9	9.4	10.11	10.6	11.1	11.8
8 ..	3.4	4.0	4.8	5.4	6.0	6.8	7.4	8.	8.8	9.4	10.0	10.8	11.4	12.0	12.8	13.4
9 ..	3.9	4.6	5.3	6.0	6.9	7.6	8.3	9.	9.9	10.6	11.3	12.0	12.9	13.6	14.3	15.0
10 ..	4.2	5.0	5.10	6.8	7.6	8.4	9.2	10.	10.10	11.8	12.6	13.4	14.2	15.0	15.10	16.8
11 ..	4.7	5.6	6.5	7.4	8.3	9.2	10.1	11.	11.11	12.10	13.9	14.8	15.7	16.6	17.5	18.4
12 ..	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.	13.0	14.0	15.0	16.0	17.0	18.0	19.0	20.0
13 ..	5.5	6.6	7.7	8.8	9.9	10.10	11.11	13.	14.1	15.2	16.3	17.4	18.5	19.6	20.7	21.8
14 ..	5.10	7.0	8.2	9.4	10.6	11.8	12.10	14.	15.2	16.4	17.6	18.8	19.10	21.0	22.2	23.4
15 ..	6.3	7.6	8.9	10.0	11.3	12.6	13.9	15.	16.3	17.6	18.9	20.0	21.3	22.6	23.9	25.0
16 ..	6.8	8.0	9.4	10.8	12.0	13.4	14.8	16.	17.4	18.8	20.0	21.4	22.8	24.0	25.4	26.8
17 ..	7.1	8.6	9.11	11.4	12.9	14.2	15.7	17.	18.5	19.10	21.3	22.8	24.1	25.6	26.11	28.4
18 ..	7.6	9.0	10.6	12.0	13.6	15.0	16.6	18.	19.6	21.0	22.6	24.0	25.6	27.0	28.6	30.0
19 ..	7.11	9.6	11.1	12.8	14.3	15.10	17.5	19.	20.7	22.2	23.9	25.4	26.11	28.6	30.1	31.8
20 ..	8.4	10.0	11.8	13.4	15.0	16.8	18.4	20.	21.8	23.4	25.0	26.8	28.4	30.0	31.8	33.4
21 ..	8.9	10.6	12.3	14.0	15.9	17.6	19.3	21.	22.9	24.6	26.3	28.0	29.9	31.6	33.3	35.0
22 ..	9.2	11.0	12.10	14.8	16.6	18.4	20.2	22.	23.10	25.8	27.6	29.4	31.2	33.0	34.10	36.8
23 ..	9.7	11.6	13.5	15.4	17.3	19.2	21.1	23.	24.11	26.10	28.9	30.8	32.7	34 6.	36.5	38.4
24 ..	10.0	12.0	14.0	16.0	18.0	20.0	22.0	24.	26.0	28.0	30.0	32.0	34.0	36.0	38.0	40.0

TABLE CONVERTING SQUARE POSTS AND BEAMS TO SUPERFICIAL MEASURE.

Size of Scantling.	Length in Feet. 8	9	10	11	12	14	16	18	20	26	100
4 x 4	10.8	12.0	13.4	14.8	16.	18.8	21.4	24.0	26.8	34.8	134.
5 x 5	16.8	18.9	20.10	22.11	25.	29.2	33.4	37.6	41.8	54.2	209.
6 x 6	24.0	27.0	30.0	33.0	36.	42.0	48.0	54.0	60.0	78.0	300.
7 x 7	32.8	36.9	40.10	44.11	49.	57.2	65.4	73.6	81.8	106.2	409.
8 x 8	42.8	45.6	53.4	58.8	64.	74.8	85.4	96.0	106.8	138.8	534.
9 x 9	54.0	60.9	67.6	74.3	81.	94.6	108.0	121.6	135.0	175.6	675.
10 x 10	66.8	75.0	83.4	91.8	100.	116.8	133.4	150.0	166.8	216.8	834.
11 x 11	80.8	90.9	100.10	110.11	121.	141.2	161.4	181.6	201.9	283.9	1009.
12 x 12	96.0	108.0	120.0	132.0	144.	168.0	192.0	216.0	240.0	312.0	1200.
14 x 14	130.8	147.0	163.4	179.8	196.	228.8	261.4	294.0	326.8	424.8	1634.

TABLE CONVERTING FLOOR, ROOF AND STUD SCANTLINGS TO SUPERFICIAL MEASURE.

Size of scant'g.	Length in Feet. 5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
2 x 1½	1.3	1.6	1.9	2.	2.3	2.6	2.9	3.0	3.3	3.6	3.9	4.	4.3	4.6	4.9	5.0
3 x 1½	1.11	2.3	2.8	3.	3.5	3.9	4.2	4.6	4.11	5.3	5.8	6.	12.5	6.11		7.6
4 x 1½	2.6	3.0	3.6	4.	4.6	5.0	5.6	6.0	6.6	7.0	7.6	8.	8.6	9.0	9.6	10.0
5 x 1½	3.2	3.9	4.5	5.	5.8	6.3	6.11	7.6	8.2	8.9	9.5	10.	10.8	11.3		12.6
6 x 1½	3.9	4.6	5.3	6.	6.9	7.6	8.3	9.0	9.9	10.6	11.3	12.	12.9	13.0	14.3	15.0
7 x 1½	4.5	5.3	6.2	7.	7.11	8.9	9.8	10.6	11.5	12.3	13.2	14.	14.11	15.9	16.8	17.6
8 x 1½	5.0	6.0	7.0	8.	9.0	10.0	11.0	12.0	13.0	14.0	15.0	16.	17.0	18.0	19.0	20.0
9 x 1½	5.8	6.9	7.11	9.	10.2	11.3	12.5	13.6	14.8	15.9	16.11	18.	19.2	20.3		22.6
10 x 1½	6.3	7.6	8.9	10.	11.3	12.6	13.9	15.0	16.3	17.6	18.9	20.	21.3	22.6	23.9	25.0
11 x 1½		8.3		11.		13.9		16.6		19.3		22.		24.9		27.6
12 x 1½	7.6	9.0	10.6	12.	13.6	15.0	16.6	18.0	19.6	21.0	22.6	24.	25.6	27.0	28.6	30.0
13 x 1½		9.9		13.		16.3		19.6		22.9		26.		31.6		32.6
14 x 1½	8.9	10.6	12.3	14.	15.9	17 6.	19.3	21.0	22.9	24.6	26.3	28.	29.9	31.6	33.3	35.0

N.B.—In the odd sizes and lengths the result is given in *full* inches only.

SCANTLING TO SUPERFICIAL.

Length in Feet.

Size of scant'g.	6	7	8	9	10	11	12	13	14	15	16	18	20	22	24	26	28	30	32
2 x 2	2.	2.4	2.8	3.0	3.4	3.8	4.	4.4	4.8	5.0	5.4	6.	6.8	7.4	8.	8.8	9.4	10.	10.8
3 x 2	3.	3.6	4.0	4.6	5.0	5.6	6.	6.6	7.0	7.6	8.0	9.	10.0	11.0	12.	13.0	14.0	15.	16.0
4 x 2	4.	4.8	5.4	6.0	6.8	7.4	8.	8.8	9.4	10.0	10.8	12.	13.4	14.8	16.	17.4	18.8	20.	21.4
5 x 2	5.	5.10	6.8	7.6	8.4	9.2	10.	10.10	11.8	12.6	13.4	15.	16.8	18.4	20.	21.8	23.4	25.	26.8
6 x 2	6.	7.0	8.0	9.0	10.0	11.0	12.	13.0	14.0	15.0	16.0	18.	20.0	22.0	24.	26.0	28.0	30.	32.0
7 x 2	7.	8.2	9.4	10.6	11.8	12.10	14.	15.2	16.4	17.6	18.2	21.	23.4	25.8	28.	30.4	32.8	35.	36.4
8 x 2	8.	9.4	10.8	12.0	13.4	14.8	16.	17.4	18.8	20.0	21.4	24.	26.8	29.4	32.	34.8	37.4	40.	42.8
9 x 2	9.	10.6	12.0	13.6	15.0	16.6	18.	19.6	21.0	22.6	24.0	27.	30.0	33.0	36.	39.0	42.0	45.	48.0
10 x 2	10.	11.8	13.4	15.0	16.8	18.4	20.	21.8	23.4	25.0	26.8	30.	33.4	36.8	40.	43.4	46.8	50.	53.4
11 x 2	11.	12.10	14.8	16.6	17.4	19.2	22.	23.10	25.8	27.6	29.4	33.	34.8	38.4	44.	47.8	51.4	55.	58.8
12 x 2	12.	14.0	16.0	18.0	20.0	22.0	24.	26.0	28.0	30.0	32.0	36.	40.0	44.0	48.	52.0	56.0	60.	64.0

Length of Scantling in Feet.

	6	8	9	10	11	12	13	14	15	16	18	20	22	24	26	28	30	32	34
2 x 2½	2.6	3.4	3.9	4.2	4.7	5.0	5.5	5.10	6.3	6.8	7.6	8.4	9.2	10.0	10.10	11.8	12.6	13.4	14.2
3 x 2½	3.9	5.0	5.8	6.3	6.10	7.6	8.2	8.9	9.5	10.0	11.4	12.6	13.9	15.0	16.4	17.6	18.9	20.0	21.3
4 x 2½	5.0	6.8	7.6	8.4	9.2	10.0	10.10	11.8	12.6	13.4	15.0	16.8	18.4	20.0	21.8	23.4	25.0	26.8	28.4
5 x 2½	6.3	8.4	9.5	10.5	11.6	12.6			15.8	16.8	18.9	20.10	22.11	25.0	27.0		31.3	33.4	
6 x 2½	7.6	10.0	11.4	12.6	13.9	15.0	16.3	17.6	18.9	20.0	22.6	25.0	27.6	30.0	32.6	35.0	37.6	40.0	42.6
7 x 2½	8.9	11.8	13.3	14 7	15.11	17.6			21 11	23.4		29 .2		35.0			43.9	46.8	
8 x 2½	10.0	13.4	15.0	16.8	18.4	20.0			25.0	26.8	30.0	33.4	36.8	40.0	43.4		50.0	53.4	56.8
9 x 2½	11.3	15.0		18.9		22.6	24.5		28.2	30.0		37.6		45.0			56.3	60.0	
10 x 2½	12.6	16.8		20.10		25.0			31.3	33.4	37.6	41.8		50.0			62.6	66.8	70.10
12 x 2½	15.0	20.0	22.6	25.0	27.6	30.0	32.6	35.0	37.6	40.0	45.0	50.0	55.0	60.0	65.0	70.0	75.0	80.0	85.0

FLOOR, ROOF AND STUD SCANTLING, REDUCED TO SUPERFICIAL MEASURE.

Size, in.	Length in Feet. 6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
3 x 3	4.6	5.3	6.	6.9	7.6	8.3	9.	9.9	10.6	11.3	12.	12.9	13.6	14.3	15.	15.9	16.6	17.3	18.
4 x 3	6.0	7.0	8.	9.0	10.0	11.0	12.	13.0	14.0	15.0	16.	17.0	18.0	19.0	20.	21.0	22.0	23.0	24.
5 x 3	7.6	8.9	10.	11.3	12.6	13.9	15.	16.3	17.6	18.9	20.	21.3	22.6	23.9	25.	26.3	27.6	28.9	30.
6 x 3	9.0	10.6	12.	13.6	15.0	16.6	18.	19.6	21.0	22.6	24.	25.6	27.0	28.6	30.	31.6	33.0	34.6	36.
7 x 3	10.6	12.3	14.	15.9	17.6	19.3	21.	22.9	24.6	26.3	28.	29.9	31.6	33.3	35.	36.9	38.6	40.3	42.
8 x 3	12.0	14.0	16.	18.0	20.0	22.0	24.	26.0	28.0	30.0	32.	34.0	36.0	38.0	40.	42.0	44.0	46.0	48.
9 x 3	13.6	15.9	18.	20.3	22.6	24.9	27.	29.3	31.6	33.9	36.	38.3	40.6	42.9	45.	47.3	49.6	51.9	54.
10 x 3	15.0	17.6	20.	22.6	25.0	27.6	30.	32.6	35.0	37.6	40.	42.6	45.0	47.6	50.	52.6	55.0	57.6	60.
11 x 3	16.6	19.3	22.	24.9	27.6	30.3	33.	35.9	38.6	41.3	44.	46.9	49.6	52.3	55.	57.9	60.6	63.3	66.
12 x 3	18.0	21.0	24.	27.0	30.0	33.0	36.	39.0	42.0	45.0	48.	51.0	54.0	57.0	60.	63.0	66.0	69.0	72.

	Length in Feet. 26	28	30	32	36	40	42	45	48	50	55	60	65	70	75	80	100
3 x 3	19.6	21.	22.6	24.	25.6	30.	31.6	33.9	36.	37.6	41.3	45.	48.9	52.6	56.3	60.	75.
4 x 3	26.0	28.	30.0	32.	34.0	40.	42.0	45.0	48.	50.0	55.0	60.	65.0	70.0	75.0	80.	100.
5 x 3	32.6	35.	37.6	40.	42.6	50.	52.6	56.3	60.	62.6	68.9	75.	81.3	87.6	93.9	100.	125.
6 x 3	39.0	42.	45.0	48.	51.0	60.	63.0	67.6	72.	75.0	82.6	90.	97.6	105.0	112.6	120.	150.
7 x 3	45.6	49.	52.6	56.	58.6	70.	73.6	78.9	84.	87.6	96.3	105.	113.9	122.6	131.3	140.	175.
8 x 3	52.0	56.	60.0	64.	68.0	80.	84.0	90.0	96.	100.0	110.0	120.	130.0	140.0	150.0	160.	200.
9 x 3	58.6	63.	67.6	72.	76.6	90.	94.6	101.3	108.	112.6	123.9	135.	146.3	157.6	168.9	180.	225.
10 x 3	65.0	70.	75.0	80.	85.0	100.	105.0	112.6	120.	125.0	137.6	150.	162.6	175.0	187.6	200.	250.
11 x 3	71.6	77.	82.6	88.	93.6	110.	115.6	123.9	132.	137.6	151.3	165.	178.9	192.6	206.3	220.	275.
12 x 3	78.0	84.	90.0	96.	102.0	120.	126.0	135.0	144.	150.0	165.0	180.	195.0	210.0	225.0	240.	300.

SPACING TABLE.

Showing the **nearest Number** of Hooks, Spikes, Laths, Dental Blocks, Pickets, Battens, Palings, &c., required when spaced in a **given length** (starting and finishing with **one**).

(Note.—If not starting with *one*, deduct it on Table.)

Given length in ft.	Spacing in Inches. 3	4	5	6	7	8	9	10	11	12	13	14	15
5	21	16	13	11	9	9	8	7	6	6	6	5	5
6	25	19	15	13	11	10	9	8	7	7	7	6	6
7	29	22	17	15	13	12	10	9	8	8	8	7	7
8	33	25	20	17	15	13	11	10	9	9	9	8	7
9	37	28	23	19	17	15	13	12	11	10	9	8	8
10	41	31	25	21	18	16	14	13	12	11	10	9	9
11	45	34	29	23	20	18	15	14	13	12	11	10	10
12	49	37	30	25	22	19	17	16	14	13	12	11	11
13	53	40	32	27	23	21	18	17	16	14	13	12	12
14	57	43	34	29	25	22	20	18	17	15	14	13	13
15	61	46	37	31	27	24	21	19	18	16	15	14	14
18	73	55	44	37	32	28	25	23	20	18	17	16	15
20	85	61	49	41	35	31	28	25	23	21	19	18	17
25	101	76	61	51	44	39	34	31	29	26	24	22	21
30	121	91	73	61	52	46	41	37	34	31	29	27	25
35	141	106	85	71	61	54	48	43	39	36	33	31	29
40	161	121	97	81	69	61	55	49	45	41	37	35	33
45	181	136	109	91	78	69	61	55	50	46	41	39	37
50	201	151	121	101	87	76	68	61	56	51	47	44	41
60	241	181	145	121	103	91	81	73	66	61	56	52	49
70	281	211	169	141	121	106	93	85	77	71	65	61	57
80	321	241	193	161	138	121	107	97	88	81	74	69	65
90	361	271	217	181	155	136	121	109	99	91	84	78	72
100	401	301	241	201	172	151	134	121	111	101	93	86	81

N.B.—If not starting with one deduct it on table.

The above is a simple division table to save contractor's time.

Example of how to use Spacing Table :—To find number of hooks or pickets, 5 inches apart, in 50 feet (starting and finishing with one) — 121—number required. Number of studs or joists, 17 inches apart in 25 feet (starting and finishing with one) — 19—number required.

SPACING TABLE.—Useful for finding the **nearest Number** of Pickets, Battens, Studs, Joists, Projections, Sleepers, Posts, &c., in a given length, over 15 inches apart :—

Lin. feet run.	Spacing in Inches. 15	16	17	18	20	24	30	36	42	48	60	72
5	5	4	4	4	4	3	3	3	3	3	2	2
6	6	5	5	5	5	4	4	3	3	3	3	3
7	7	7	6	6	6	5	4	4	3	3	3	3
8	7	7	7	7	6	5	5	4	4	3	3	3
9	8	8	8	7	7	6	5	4	4	4	3	3
10	9	9	9	8	7	6	5	5	4	4	3	3
11	10	10	9	9	8	7	6	5	5	4	4	3
12	11	10	9	9	9	7	6	5	5	4	4	4
13	12	11	10	10	9	8	7	6	5	5	4	4
14	13	12	11	11	10	8	7	6	5	5	4	4
15	14	13	12	11	10	9	7	6	6	5	4	4
18	15	15	14	13	12	10	9	7	7	6	5	4
20	17	16	15	15	13	11	9	8	7	6	5	5
25	21	20	19	18	16	14	11	10	9	8	6	6
30	25	24	22	21	19	16	13	11	10	9	7	6
35	29	28	27	25	22	19	15	13	11	10	8	7
40	33	31	30	28	25	21	17	15	13	11	9	8
45	37	35	33	31	28	24	19	16	14	13	10	9
50	41	38	37	35	31	26	21	18	16	14	11	10

If not starting with one, deduct it upon Table.

For Spacing Table up to 1 mile, for fencing posts, or droppers, &c

(*See* WIRE WORKER)

Parquet flooring.—Anglo-Swiss, in polished hardwoods, viz., ebony, oak, walnut, maple, cherry, &c., one inch thick, T.G. and secretly nailed, well seasoned and very durable. It can be laid complete from 18s. per sup. yard, exclusive of the cost of common floor, about 6s., upon which it is laid.

Italian Parquet flooring, delivered f.o.b. at Venice, from 11s. 6d. to 23s. per sup. yard. It is made in quarter mitres (½ mitre square) of walnut, maple and oak. Hoffnung's warehouse, Pitt-street, Sydney contains samples laid complete.

New Zealand Parquetry.—*See* end of New Zealand Building Materials at end of this book.

Clear Pine Shelving, for Library, with 2 x 1¼ cedar nosing, partitions 5ft. apart, labor only, per sup. ft.				0	0	8
Redwood	ditto	ditto	.. .. ..	0	0	7

JOINER.

Measurement.—To the full length of the timbers add the length of tenons, dovetails, scarfs, and all other waste in conversion ; no timber should be cubed of less than 9 superficial inches in sectional area, and then only for engineering works.

In all superficial work such as floors, ceilings, partitions, walls, &c., for "Labor and Nails," or "Labor only," take the full dimensions, including well-holes, chimney breasts, doorways, windows, &c , which are not to be deducted, except the opening exceeds 36 superficial feet, when one-half the area only is allowed.

King and queen posts should be taken full size without deduction, for waste in cubing or squaring.

See The Rules for Measurement mentioned in Carpentry.

Memorandum.

The foregoing prices are reckoned at the high rate of **fourpence per foot** for materials.

As the items of material and labor are kept separate, *any reduction* in the *price* of material *can be allowed* for in forming estimates.

The supply of joinery ready for fixing by the special steam joinery works advertised on advt. pages 30, 33, 34, &c., has simplified the estimating of this branch in contracts.

A FAIR DAY'S WORK FOR A GOOD TRADESMAN.

Set and bed 10 to 14 box frames, ordinary.
Fit and hang 7 to 10 window sashes.
Fit and hang 6 to 10 doors.
Fit, hang, and lock 4 to 8 doors.
Set door jambs, 6 to 10 sets.
Fit and hang double slide doors, or fix track for one pair.
Fit and hang single slide doors, 2 pairs.
200 to 400 lin. feet plaster grounds.
125ft. good, and 250ft. ordinary picture mould.

DOOR AND CASEMENTS.

Example per Table.—Cost of Cedar Door.

	£	s.	d.
4-panel double, raised moulded door, 7ft. x 3ft. x 1¾in., as per Table. 21 sup. ft., at 1/9	1	6	9
Add 80 per cent. for cost in cedar	1	1	5
Price, without furnithre, varnishing, or hanging ..	2	8	2

Any similar work otherwise than doors can be reckoned by table of doors.

DEAL PANELLED AND OTHER DOORS.—*All Materials, per foot super.*

Materials reckoned at 4d. per sup. foot and Joiners' wages at 15d. per hour.	1 inch. s. d.	1¼ inch. s. d.	1½ inch. s. d.	1¾ inch. s. d.	2 inch. s. d.	2½ inch. s. d.
Ledged doors, traps and flaps, T. G. and beaded ...	0 9	0 10	0 11	.....	.....	.....
Ledged and braced, or folding, or in 2 heights ...	0 10	0 11	1 0	.....	.....	.....
Dwarf doors, 1 panel moulded and square, including framed fronts...	1 2	1 3	1 4	.....	.....	.....
Skeleton doors, 4 panels flush for covering	.....	1 2	1 4	1 6	1 8	.....
Closet doors, 2 or 3 panel square	1 1	1 2	1 3	.....	.....	.....
Ditto, four panel moulded and square	1 3	1 4	1 5	.....	.....	.....
4 panel doors, framed and ledged	.....	1 3	1 4	1 6	1 8	2 0
Ditto, bead butt, or moulded and square ...	.....	1 4	1 5	1 7	1 9	2 1
Ditto, double moulded	.....	1 5	1 6	1 8	1 10	2 2
Ditto, folding doors with raised panels	.....	.....	1 9	1 11	2 1	2 4
Ditto, bolection or raised moulded	.....	1 6	1 7	1 9	1 11	2 2
If 6 panel doors, add to 4 panel doors	.....	.....	0 2	0 2	0 2	0 2
If 8 panel door ditto	.....	.....	.....	0 4	0 4	0 4
8 panel folding doors with raised moulding	.....	.....	2 0	2 3	2 6	2 9
6 panel doors, raised panels and raised mouldings ...	.....	.....	2 0	2 3	2 6	2 9
Sash doors, 4 or 6 lights, lower panel moulded (glazed)	.....	.....	1 3	1 4	1 6	.....
Sash doors with raised mouldings, upper panel fluted plate glass (1 light)	.....	.....	.....	2 0	2 2	2 4
Sash doors, raised mouldings and margin lights (glazed)	.....	.....	1 8	1 10	2 0	2 2
French casements, moulded and glazed	.....	.....	1 6	1 8	1 10	2 0
French casements, raised mouldings (glazed)... ...	.....	.....	1 10	2 0	2 2	2 4
Ditto, ditto, and circular glass ...	.....	.....	2 0	2 2	2 4	2 6
Ditto. raised panel, moulded and circular glass ...	.....	.....	2 2	2 4	2 6	2 8

The present rate of wages is higher than calculated by above table, but allowance can be made for any difference by the per cent. increase.

DOOR FRAMES.

(*Mill Prices.*)

	Each. £ s. d.
5in. x 3in. Hardwood Door Frames, with loose stops, 13/6 ; with md. transoms	0 17 6
5in. x 3in., with md. transoms, prepared for circular fan-lights	1 4 0
5in. x 3in. Hardwood Door Frames, with transom and mullions, square head	1 15 6
5in. x 3in. Hardwood Door Frames, with md. transom sq. head and side lights	1 15 6

CASEMENT FRAMES.

	£ s. d.
5 x 3, with loose stops, transom, and 8 x 2 sill	1 0 6
5 x 3, with mullions for 5ft. 6in. x 8ft. 8in. opening ..	1 18 0
5 x 3 Hardwood Door Frames, with md. transoms and H.W. Casement sills, 8in x 2in.	1 0 6

FANLIGHTS.

(Oregon or Redwood—Glazed.)

	s. d.		s. d.
2-8 x 1-2	5 0	3-4 x 1-4	6 6
2-10 x 1-4	5 6	3-6 x 1-6	7 0
3-0 x 1-4	6 0	4-0 x 1-6	8 6
3-0 x 1-6	6 6	4-0 x 2-0	9 3

Cedar Fanlights extra, up to 3ft. wide, 6d. each ; over 1/- each Packed for safe carriage, 9d. per package extra.

STOCK BOX FRAMES.

glass panes.	ft. in.	ft. in.		
10 x 8, Daylight sizes,	3-11¾ x 2-4	.. ..	each	10 6
10 x 12, ,, ,,	4-7¾ x 2-10	.. ..	each	12 6
10 x 14, ,, ,,	5-3¾ x 2-10	.. ..	each	14 6
10 x 16, ,, ,,	5-11¾ x 2-10	.. ..	each	15 6
12 x 14, ,, ,,	5-3¾ x 3-4	.. ..	each	16 6
12 x 16, ,, ,,	5-11¾ x 3-4	.. ..	each	17 6

Wide Sills, 1/- extra.

Daylight size of Box Frames means from under side of sill to under side of head of frame.

SASHES.

Stock Size Sashes (Glazed). per pair.

Size.	Size over all.	2 lights. s. d.	4 lights. s. d.	12 lights s. d.
10 x 8	3-9½ x 2-4		8 6	8 0
10 x 12	4-5¾ x 2-10	11 0	9 0	8 9
10 x 14	5-1¾ x 2-10	13 6	10 6	10 0
10 x 16	5-9¾ x 2-10	16 0	13 6	13 6
12 x 14	5-1¾ x 3-4	18 0	16 0	16 0
12 x 16	5-9¾ x 3-4	19 6	19 0	19 0

VENETIAN SHUTTERS—(Minimum 14ft.).

	s. d.		s. d.
1½ thick per foot, surface	1 6	to	2 0
1¾ thick per foot, surface	1 9	to	2 3
1½ Hanging Styles, per set	2 6	to	3 3
1¾ Hanging Styles, per set	3 0	to	3 9

BACK DOOR AND FANLIGHT. Fixed Complete.

	£	s.	d.
Overall size, including architrave 8ft. 4in. x 3ft. 4in. = 28 square feet.			
1¾in. pine, bead butt and square, glazed 12in. fanlight, 24 sup. feet at 1/6	1	16	0
5 x 3 hardwood rebated frame with transom	0	18	0
4in. architraves, 6/– ; furniture, painting and hanging, 24/–	1	10	0
	£4	4	0

28ft. at 3/– equals Cost price.

FRONT DOOR AND FANLIGHT. Fixed Complete.

	£	s.	d.
Overall size, including architrave, 8ft. 4in. x 3ft. 6in = 30 sq. ft.			
2in. pine front door, double raised moulded with transom light, 26oz. glass, glazed and swivel hung, 27 sup. ft. at 2/–	2	14	0
5 x 3 hardwood rebated and beaded frame and transom rail fixed and painted	1	0	0
23 lin. ft., 5in. sing. faced architrave fixed	0	8	0
Graining oak and varnishing, 2 coats, 8 yds.	1	0	0
Furniture, ordinary, and hanging door, &c.	0	18	0
30 sq. ft. at 4/– equals cost price	£6	0	0

Ordinary Front Door Opening fixed complete.

With side lights, fanlights, architraves, stops, locks and fixings complete. Size 8ft. x 5ft. x 1¾. joinery from 4/– to 5/– per sq. ft.			
40ft. surface x 4/–	£8	0	0

Box Frames, Sashes, per square foot.

Machine stock sizes, sashes 6ft. x 3ft. 6in. x 1½ : Box frame, 17/6 ; sashes (glazed), 15/– ; nosing, &c., 1/6	1	14	0
18ft. of 5in. architraves at 15/– per 100	0	3	0
Weights, fittings and finishing	0	13	6
Labour, fixing, one man 4¼ hours	0	6	6
Or 21ft. at 2/8 per square foot net	2	17	0
Painting each opening 3 coats, say	0	10	0
Profit to be added, 10 per cent.	0	6	6
21ft. at 3/6 per foot square	3	13	6

In tendering reckon finished work from 3/6 to 4/6 per square foot.

Example cost—Verandah or Balcony Enclosure, sliding sashes, 4ft. high x 8ft. spans, three sashes 1¾in. thick, glass 21oz., H.W. sill and head framed between ver. posts, painted, complete—net cost per sq. ft.	0	2	0

GLAZED DOOR AND FANLIGHT.

Example cost—8ft. x 3ft. opening, door-frame 5in. x 4in., Oregon door 6ft. 10in. x 2ft. 10in. x 1¾in., 1¾in. fanlight, glazed 21oz., lock 3/6, painted complete, per sq. ft. .. 2 3

Curved transom fixed lights in small panes, glazing 1/–, segment 8ft. x 1ft. 6in. x 1¾in., complete, per sq. ft. .. 0 3 0

JAMB LININGS (Oregon) AT MILL.

Per 100ft. lineal, 4½ x 1½ single rebated, 20/– ; 6 x 1½, 23/– ; 11 x 1½ double rebated, 38/–.

5¾ x 1½ single rebated, ready for fixing, per set, 7/6 ; with transom, 10/–.

10½ x 1½ double rebated, no transom, 10/9 ; with transom, 14/3.

15 x 1½ double rebated, no transom, 15/9 ; with transom, 19/9.

Example cost—Cedar Inside Door, Jambs, etc.

Fixed complete.	£	s.	d.
1¾in. cedar double moulded, 4 panel door, 7ft. x 3ft. ..	2	0	0
Jamb linings, cedar, 10½ x 1½, double rebated and fixed, including plugging	1	12	0
Cedar 5in. single faced architraves, 2 sets secured to plugs, complete	1	6	0
9 sup. yards spirit varnishing, 11/– ; furniture, 12/– ; hanging, 5/–	1	8	0
21 surface feet at 6/– per foot—cost price	£6	6	0

GATES AND COACH-HOUSE DOORS.

Per foot super.

	Materials. s. d.	Labour fixed s. d.
2in. deal, framed and braced, with inch deal ..	0 8	1 0
2½in. ditto, with 1½in. framed rails and braces filled in with inch deal, rebated and beaded ..	0 10	1 2
2in. deal, palisade gates, lower part bead butt, or bead flush and square, upper part 1¼in. palisades ..	0 7	1 1
2½in. ditto. do.	0 9	1 3
2in. deal, 6 panel gates, bead butt or bead flush and square	0 9	1 8
2½in. ditto do.	0 10	1 10
If 3in. deal gates, add on the 2½in.	0 2	0 2
If framed with a wicket, add	0 1	0 2
Hanging 12 panel heavy folding, grand entrance doors, say 6ft. x 12ft. x 2½in., with 3 pairs heavy hinges	£2 10	0

Hinges and other ironmongery to be charged extra

BOX FRAMES AND SASHES.

Not glazed, per foot super.	Materials. s. d.	Labour fix d. s. d.
Deal-cased frames, *hardwood* sunk sills, 1½ in moulded sashes, double hung, brass-cased pullies, patent lines and iron weights	0 10	1 4
Deal-cased frames *hardwood* sunk sills, 2 inch moulded sashes, double hung, brass cased pullies, &c., as above	0 11	1 5
Deal-cased frames, double hung, with 2½ inch sashes, &c., as before ..	1 0	1 6
Ditto, with semi-circular head and span-drills, to show square inside ..	1 0	2 0
Ventilator (small), frame 2 × 1½ blades 2 × ½, 3 inches apart	0 6	3 6
VENETIAN deal-cased frames, *hardwood* sunk sills, 1½ inch moulded sashes, double hung, &c., as above	1 0	1 4
Ditto, with 2 inch sashes, ditto ..	1 1	1 6
Ditto, with 2½ inch sashes, ditto ...	1 2	1 9

SKYLIGHTS, FANLIGHTS, ETC.

Per foot super.	Materials. s. d.	Labour fixed. s. d.
1½ inch deal moulded or bevelled bars ..	0 2½	0 7½
Ditto with cross-bars	0 3	0 9
2 inch deal moulded or bevelled bars ..	0 3	0 8
Ditto with cross-bars	0 3½	0 8½
For every ½ inch extra thickness, add ...	0 0½	0 1
FAN-LIGHT, 1½ inch deal, one light ..	0 3	0 6
2 inch deal, do. ..	0 4	0 7
2½ inch deal, do. ..	0 5	0 8

WINDOW LININGS, ELBOWS, AND SOFFITS.

Per foot super.	Materials. s. d.	Labour s. d.
Inch, or 1¼ inch deal, 2 panel square, framed, back linings, elbows or soffits	0 5	1 0
Bead butt, or moulded, add	..	0 2
Bead flush, or quirk moulded, add ..	..	0 3
Each panel above 2, if square, add ..	..	0 2
Ditto, if moulded add ..	..	0 3

Shutters, Grounds, Door Linings.

Per foot super.	Materials. s.	d.	Labour fixed. s.	d.
1½ inch Venetian or Louvre shutters, secured to box frames	0	8	1	4
1¾ inch do. do. ..	0	9	1	5

For Circular work, see Rules, for measurement.
All fastenings, iron shoes, parliament hinges, &c., extra.

Framed Grounds.

Per foot super.	Materials. s.	d.	Labour fixed. s.	d.
Inch deal framed grounds	0	4	0	7
If 1¼ inch deal, add	0	1	0	1
1 inch skeleton grounds, for pilasters, &c.	0	4	0	6
1¼ inch ditto ditto ..	0	5	0	7
1½ inch ditto ditto ..	0	6	0	8

Door Linings.

Per foot super.				
1¼ inch deal, single rebated	0	5	0	7
1¼ inch square framed 2 panel jambs, and 1 panel head, single rebated ..	0	5	1	0
Ditto, bead butt, bead flush or moulded ..	0	5	1	1
Ditto, reed flush, or raised moulded ..	0	5	1	2
For extra panel or double rebated, add ..	0	0	0	1
If 1½ inch, add	0	1	0	1

Example.—Required the cost of 1½ inch deal double rebated door linings upon one inch deal framed grounds.

Item 1 of framed grounds, and item 1 and 5 of door linings, viz :—

	s.	d.
Materials, Grounds, 4d. ; Linings, 5d.	0	9
Labour, do. 7d. ; do. 8d.	1	3
Cost price per sup. foot, 2s.		

Wood Carving.—The cost of carving in cedar is almost the same as in Sydney or Brisbane freestone. See index.

Carving in Blackwood the same as for Spring Bay stone.

Clear Pine Carving about the same as for Oamaru freestone.

Colour.—The lighter the colour of the ornament, or enrichment the more readily is any defect observed. For this reason a Corinthian capital which might be passable if carved in cedar or blackwood, would look coarser in clear pine, and would be scarcely passable in plaster of Paris.

PARTITIONS.

	Per foot super. Materials only.		Labour fixed.	
	s.	d.	s.	d.
1in. **T. and G. Oregon Partition** vert. boards, 4 x 1, with centre ledge, torus md. 3in. x 3in. both sides, next ceiling, secured at foot with 6in. skirting both sides	0	4½	0	1½
(*See Example Below.*)				
1½in. panelled partition, single moulded	0	6	1	0
Ditto, moulded both sides	0	6	1	1
2in., square-framed partition, in 4ft. x 18in. panels	0	8	1	1
Ditto, moulded and square panels	0	8	1	2
Ditto, moulded both sides	0	8	1	3
Smaller panels extra to framing	0	9	1	4
If raised moulded, add	0	0	0	1

Example—One square of partition per first item reckoned out :—

	£	s.	d.
100ft. T. and G. and bd. 4in. x 1in. boards, at 28/– ..	1	8	0
10ft. beaded 4in. x 1in. centre-ledge rail	0	2	0
10ft. grooved and dressed 3in. x 3in. hand rail, at 30/– ..	0	3	0
20ft. of 6in. skirting bottom, at 22/6	0	4	6
100 sq. ft. material, at –/4½ per sq. ft.	1	17	6
,, ,, labour and nails at –/1½	0	12	6
,, ,, at –/6 per sq. ft.	2	10	0

COUNTERS.

(See Patent Partitions.)

	Per foot super. s.	d.	s.	d.
1in. deal top, glued and blocked	0	5	0	6
1¼in. ditto do.	0	6	0	7
1¼in. deal fronts, framed square	0	5	0	6
Ditto do. moulded	0	5	0	7
Morticed clamps, per foot run	0	1½	0	6
Tongued heading joints, per foot run	0	1½	0	4½
Mitres to clamps each	0	0	0	8
Fitting and hanging flaps, each	0	0	1	6

Example cost—Counter, 9ft. long, mock panelled and moulded ; framed front 3ft. x 1½in. thick ; pine top 1ft. 9in. wide x 1¾in. thick, covered with linoleum 3/– per yard ; four stamped metal inserts in front, per foot run 1 10 0

Example cost—Counter framed, raised md. and panelled pine front, top 2ft. x 2in. thick, with carved brackets every 3ft. apart, per foot run 2 0 0

PANELLING. Etc.

	Per foot super. Materials. s. d.	Labour fixed. s. d.
Machine dressed timber, –/4 per ft.; *labour* at 12/– per day.		
1¼in. deal, framed, rebated and beaded	0 5	1 2
Inch and 1¼in., ditto, splayed	0 5	1 3
Inch and 1¼in. boxings for sliding shutter, or sashes, double hung, including grooves, beads, fillets, &c.	0 5	1 6

Panelling.—Wrought one face.

1¼in. moulded, bead butt or bead flush	0 5	0 8
If less than 3ft. panels, or raking to stairs, add ..	0 1	0 2
If raised moulded, add..	0 1	0 2

Mock panelling about 40 per cent. less for labour.
For cedar or circular work, see Index.

Framed Panelling, double-faced, 3ft. panels.

1¼in. moulded of bead flush and square	0 5	1 2
Bead flush and bead butt	0 5	1 3
For every ¼in. thick, add	0 1	0 1
1½in. ditto circular openings	1 0	2 0

STAIRCASES.

	Complete, per storey. £ s. d.		£ s. d.
Common stairs, close strings, 1 flight.. ..	3 0 0	to	4 0 0
Dog leg stairs, open strings	6 0 0		8 0 0
Stairs with open strings, return nosings, continued handrail steps about 3½ft. long, 12ft. rooms	18 6 0		20 0 0
Geometrical stairs, with single rail, steps about 5ft. long, ditto	26 0 0		32 0 0
Ditto ditto per step ..	1 5 0		1 12 0

	Per foot super. Materials. s. d.	Labour fixed. s. d.
Inch wrought steps, risers, and two carriages ..	0 6	0 8
1¼in. wrought deal steps, risers, and two carriages	0 7	0 8
Ditto, glued and blocked, with moulded nosings ..	0 8	0 11
Ditto, mitred to cut string and dove-tailed for balusters	0 8	1 2
Ditto do. bracketed	0 8	2 4
1¼ squared framed spandrels	0 6	0 10
Ditto moulded or bead butt	0 7	1 0

STAIRCASES.

Extra Items, each.

	Materials. s. d.	Labour. s. d.
Quarter bullnose step glued upright	1 9	6 3
Full bullnose step and riser	3 0	30 0
Returned moulded and mitred nosings	0 3	2 6
Ditto, circular	0 4	4 0
Plain cut brackets	0 4	2 6

String Boards.

	Per foot super. s. d.	s. d.
1¼ inch plain wall string	0 5	0 9
1½ inch ditto ditto	0 6	0 10
2 inch ditto ditto	0 8	1 0
If moulded, add	0 1	0 2
1¼ inch deal, plain outside string, rebated, beaded and framed to newels	0 5	1 0
Ditto sunk and beaded, or moulded	0 5	1 2
Ditto, and mitred to risers	0 5	1 3

Writhed strings, or facia, four times the price of straight for labour and twice for material. For cedar and circular work, see Index.

Hand Rails, Balusters, Newels, etc.

	Per lin foot. Materials. s. d.	Labour fixed. s. d.
Cedar oval 4-inch handrail sunk for balusters ..	0 6	1 6
Deal moulded handrail ditto	0 3	0 9
Ditto do. ramped	0 6	2 0
Ditto swan-neck, or level circular	0 9	2 6
Ditto, solid writhed	1 0	6 0
Half-rails, two-thirds of the whole.		
Cedar handrail 3in. x 1½in., oval polished to spiral stairs, screwed to iron band, per foot run ..		4 6
Ramps to same .. .. each		7 0
Cedar handrail 5in. x 4in., special, fixed and polished		8 6
Ramps for ditto ditto		17 6

Newels and Balusters.

	Materials. s. d.	Labour fixed. s. d
Newel 4-inch stop chamfered with moulded cap and plinth	0 8	2 0
Inch square bar balusters, each	0 2	0 8
Fixing iron newels, each	0 0	4 0
Ditto iron balusters, each	0 0	1 6
Ditto stays, ditto	0 0	0 9

Iron newels, balusters, and stays, charged extra at per lb.

Including plugging, fillets, and backings.

Machine made and fixed complete.

Per lineal foot.	4 inch. s. d.	5 inch. s. d.	6 inch. s. d.	7 inch. s. d.	8 inch. s. d.
Skirtings beaded or moulded	0 3	0 4	0 5	0 6	0 7
Architraves single faced ..	0 4	0 5	0 6		
Ditto, double faced ..	..	..	..	0 9	0 10
	9 inch.	12 inch.	14 inch.	16 inch.	18 inch
Skirtings double sunk and moulded	0 6	0 9	1 0	1 1	1 2
Ditto plain or moulded ..	0 5	0 6			

If made by hand add one-fourth to these prices.

Fixing machine-wrought architraves or skirtings, costs about 2d. per lineal foot, including plugging and mitering, or scribing at corners.

Mouldings.	*Per super foot.* Materials. s. d.	Labour fixed. s. d.
Base, surbase, double architraves, cornice, and skirting mouldings	0 8	1 0
Ditto if worked by hand	0 9	1 6
Reed mouldings in pilasters, &c.	0 6	0 9
Church Gothic cornices, worked by hand	1 0	2 0
	Per foot super. Materials. s. d.	Labour fixed. s. d.
Capitals and Bases.		
Capitals and bases prepared for carvers or turners, glued in thicknesses, not exceeding 3in. thick..	2 0	2 4
Ditto glued upright and blocked for ditto ..	2 4	3 0
Reeds or flutes to columns, one-half more.		
Turning to be charged extra. For prices see index.		
Cradling, to entablature, 1½in. thick	0 4	0 6
	Per foot run fixed Materials. s. d.	Labour. s. d.
Single Mouldings.		
¾ inch and inch common O.G. astragal, &c. ..	0 0½	0 0½
Ditto, quirked O.G. ovolo, &c.	0 0½	0 1
Inch rounded or moulded nosing	0 0	0 1½
Beaded capping, with O.G. under	0 1	0 3
Narrow skirting grounds	0 1	0 1½
Ditto grooved or rebated	0 1	0 2
Square angle staff, rebated	0 0½	0 2½
1¼-inch angle bead	0 0½	0 2
Glued and mitred borders to hearth, &c.	0 1	0 6
1¼ and 1½ inch common O.G. torus, ovolo, or bead, fixed	0 0½	0 1½
Single-faced architraves, 4 or 5 inches wide ..	0 1½	0 4
Deal moulded hat-rail, per foot run	0 2	0 6

Church Ventilators.

	Materials s.	Materials d.	Labour s.	Labour d.
Ventilator for gable, 3 ft. sides, equilateral triangle, with 4 × 2½ hardwood frame fixed in 4½ inch reveals and filled with 6 × 1 Louvre boards, all clean wrought	4	0	18	0
Ventilator (*2nd rate*) *for side of roof*, 3 feet equilateral triangle, and 4 ft. ridge-roll frame 2 × 1½ nailed together, and filled with 3½ × ¾ Louvre, sides covered with redwood T. and G. flooring	4	0	16	0
Ventilator for church ceiling, 3',4" *diam.* 1¼ in. pine, cut with 4 trefoils and centre quatrefoil openings, 3 in. bold moulding planted round edge in segments fixed complete	10	6	18	0
Front of Pews, 8 ft. × 2',9" × 1½ in. stiles muntins and rails stop chamfered on face, also 6 diagonal V grooved 1 in. panels, flush and chamfered at back per foot super	0	6	1	0
Pew backs, 8 ft. × 20 ins. × 1½ in. face stop chamfered, three 1 in. bead and flush panels, per foot super	0	6	0	11
Seat for ditto, 8 ft. × 12 ins. × 1½ in., with rounded edge, supported at ends and by 2 seats, per foot run	0	6	0	6
Pew backs open, as before, without panels	0	5	0	10
Church pews complete, 9 feet long, similar to the above with stall ends (curved tops and carved number, 3',2½ × 15½ ins. × 3 ins. fixed on soles, 17 × 4 × 4, secured to floor, backs, seat, &c., as before ..	30	0	50	0

Gothic Doors and Windows are often mill made, the price being similar to circular headed doors, &c.; if hand made they cost about 50 per cent. more than if square headed.

Pulpits, Reading Desks, and **Rostrums** are too varied in design to give any definite prices; the rough framing, panelling, cornice and other mouldings, carving, &c., may be obtained from items under these headings. See index.

SCHOOLASTIC FITTINGS.

	Sydney prices. £	s.	d.
Forms 17 ins. high, tops 9 ins. wide, p. lin. foot	0	3	6
Ditto, 15 ins. high, tops 8 ins. wide do. ..	0	3	0
Ditto, 12 ,, ,, 7 ins. wide, for infants, with cedar backs 3 × 1¼ ins., supported with iron stays, ⅞ × ⅜, not more than 4 feet apart	0	6	0
Desks 26 ins. high, 15 ins. wide, screwed to iron standards which are screwed to floor, 5 feet apart, per lin. foot	0	3	0
Ditto, 24 ins. high, by 14 ins. wide ditto..	0	2	6
Tablets 24 ins. × 18 ins. × ¾ inch each..	0	6	0
Ditto, 18 ins. × 16 ins. × ¾ inch do..	0	5	0
Book press 3 ft. wide, 4 ft. high, and 18 ins. deep	5	0	0
Strong wooden chairs, polished cedar each ..	0	10	0
Table, polished cedar, 3 ft. × 2 ft, with 2 drawers and turned legs..	3	10	0
Ditto, 5 ft. × 3 ft. ditto ..	5	10	0
Black board, 4 ft. × 3 ft. × 1¼ thick, stained black	1	1	0
Easel for board, 5 ft. 6 ins. high, varnished, 2 coats	1	7	6
Iron hat pegs, 9 ins. apart on 2½ × 1 beaded batten, secured to wall and painted 3 coats, per lin. foot	0	0	3
Light folding tripod (to show maps on) 7 ft. 6 in. high, with 1½ in. round legs, hinged to a 2 in. top	1	17	6
Pointer, 5 ft. × 1¼ in. diam., tapering to ½ in diam	0	3	6
Beaded batten, 3 × ¾, fixed to wall to hang maps and tablets on, painted 3 coats, per lin. ft. ..	0	0	2

TURNERS' WORK.

Turners' wages 1s. 4d. per hour, and Clear Pine 5d. per sup. foot.

Per pair.	Labour only. s.	d.	Clear Pine. s.	d.
Tuscan base and Capital for 6 inch column ..	2	6	1	0
Ditto ditto 9 inch column ..	3	6	2	6
Ditto ditto 12 inch column ..	4	6	5	0
Doric base and capital for 6 inch column ..	3	6	1	0
Ditto ditto 9 inch do. ..	4	6	2	6
Ditto ditto 12 inch do. ..	5	6	5	0
Base and cap for 4 inch verandah post ,,	3	0	0	8

	Each.	Labour only. s.	d.	Clear Pine s.	d.
Ionic base for 6 inch column (major diam.)	..	3	4	0	8
Ditto 9 inch column	.. ..	4	0	1	6
Ditto 12 inch column	.. ..	4	8	3	0
Corinthian or Composite base for 6 in. column		4	0	0	8
Ditto ditto 9 in. do..		5	0	1	6
Ditto ditto 12 in. do..		6	0	3	0
Ditto capital for carving 6 in. do..		2	8	1	6
Ditto ditto 9 in. do..		4	8	3	0
Ditto ditto 12 in. do..		6	8	6	0
Newels 3 in. diameter and 4 feet long	..	1	6	1	4
4 in. ditto ditto..	..	2	6	2	6
5 in. ditto ditto..	..	3	0	3	0
6 in. ditto ditto..	..	5	0	4	0
8 in. ditto ditto..	...	7	6	7	6
10 in. ditto ditto..	..	13	6	12	0
Balusters ordinary for staircases, 2 in. diam.	..	0	8	0	3
Ditto best ditto ditto	..	1	0	0	3½
Ditto, best with spiral column, ditto	.. ..	4	0	0	4
Ditto for parapets, loggias, &c., 3 in. diameter and 12 ins. high	.. .. ..	1	0	0	4
Ditto 4½ in diameter and 18 ins. high	...	2	0	0	11
Ditto 6 in. do. and 24 ins. do.	..	3	4	2	0
Solid ball for finial, &c. 4 ins. diameter	..	2	8	0	6
Ditto do. 8 ins. do.	..	4	0	1	8
Ditto do. 12 ins. do.	..	5	4	4	0

ANGLES, Degrees and tenths for opening of a Two-foot Rule, in inches and quarters.

Ins.	Degrees	Ins.	Degrees	Ins.	Degrees	Ins.	Degrees	Ins.	Degrees
¼	2.4	4¼	20.4	8	39.0	11¾	58.6	15¼	80.4
½	3 6	½	21.6	¼	40.2	12	60.0	½	82.0
¾	4.8	¾	22.8	½	41.5	¼	61.4	16	83.6
1	6.0	5	24.0	¾	42.8	½	62.8	¼	85.2
¼	7.2	¼	25.3	9	44.0	¾	64.2	½	86.9
½	8.4	½	26.5	¼	45.3	13	65.6	¾	88.5
¾	9 6	¾	27.7	½	46.6	¼	67.0	17	90.2
2	10.8	6	29.0	¾	47.9	½	68 5	¼	91.9
¼	12.0	¼	30.2	10	49.2	¾	69.9	½	93.6
½	13.2	½	31.4	¼	50.6	14	71.4	¾	95.4
¾	14.4	¾	32.7	½	51.9	¼	72.9	18	97.2
3	15.6	7	33.9	¾	53 2	½	74.3	¼	99.0
¼	16.8	¼	35.2	11	54.6	¾	75.8	½	100.8
½	18.0	½	36.4	¼	55.9	15	77.4	¾	102.7
¾	19.2	¾	37.7	½	57.3	¼	78.9	19	104.7

N.B.—The tenth of 1 degree varies from one-fiftieth to one-eighteenth of an inch

SUMMARY OF PRESENT RULING CONTRACT PRICES.

	£	s.	d.
Excavation over site, per cubic yard	0	4	0
Ditto trenches	0	5	0
Concrete foundations, per cubic yard	1	15	0
Concrete 5in., small sections, per super yard	0	8	0
18in. foundation, bricks in cement, per 1000	5	5	0
14in. ditto bricks in mortar, per 1000	5	2	6
Flooring and joists, per square to 15in. section—			
4in. x 2in. joists, 4in. x 1in. T. & G. Oregon boards,	3	0	0
Oregon pine joisting and studding, per 100 sq. ft.	1	3	0
2in. x 2in. herringbone trussing, per foot run	0	0	6
Oregon pine roofing, to 15in. section	1	6	0
6in. or 4in. x 1¼in. T. & G. tallowwood flooring boards	2	11	0
Ditto ditto Kauri pine, per square	2	16	0
1ft. wgt. rusticated H. W. weatherboards	2	2	0
Shelving or bearers, per foot super	0	0	8
1¼in. **framed counter**, 3ft. high x 1ft. 9in., per ft. run	1	10	0
¾in. Baltic T. G. & B. lining ceilings, per 100 sq. ft.	1	4	0
¾in. Colonial pine, £1 10/– ; Kauri, £1 15/– ; Cedar	3	15	0
Oregon pine sheathing roof, rough	1	5	0
Ridge and hip roll, per foot run	0	0	4
Reb. laps for lead gutters, each	0	0	7
4ft. batten fencing, per foot run	0	3	9
Framed double gates, 9ft. wide	5	0	0
4ft. wicket gates, framed 3ft. wide x 3in. thick, hung and fitted complete	2	10	0
5ft. sawn paling fencing, per rod	1	3	0
6ft. ditto ditto ditto, per rod	1	8	0
6ft. weatherboard fencing (unpainted)	0	3	6
6ft. corrugated gal. iron fence	0	4	3

FITTINGS AND JOINERY FIXED.

	Per foot super. Pine. s. d.	Cedar. s. d.
Jamb-linings, 1½in. door, rebated in pine	0 10½	1 8
Ditto, with transome	1 1½	2 0
	Per foot run.	
Architraves, 5in. and 6in. x 1½in., md. redwood, 7d. ; cedar		1 8
Skirting, 9in. x 1in., md. redwood, 6d. ; cedar		0 9
Ditto, 12in. x 1¼in., redwood, 11d. ; cedar		1 3
Grounds, 3in. x ¾in.—Wrought deal and cedar plugs, fixed		0 3
Wood mouldings, redwood, at per inch girt		0 1½
Doors, pine, double md., hung, per inch, per ft. super		0 9
Example—7ft. x 3ft. x 2in. door equals 42 sq. ft. at –/9		31 6
Viz., Amer. pine door, 23/6 ; hanging and hinges, 8/–		

CEMENT.

PORTLAND CEMENT.

PORTLAND CEMENT manufacturers in the State produce a cement that will now compare favourably with any European make, and which is up to the standard of tests required for best cements.

The making of Cement from the raw materials—limestone, clay and shale—together with its intricate tests, are matters for the manufacturer and the civil engineer. But a few remarks on how to use it so as to get the best results may be useful. All good cements are exceedingly fine and heavy, and of a bluish grey colour.

Extract from "Facts and Figures" regarding the use of Concrete. Published by the Commonwealth Portland Cement Co.

Slow setting cement is preferable to quick setting cement for all general purposes.

Cement Mortar.—The cement and clean sharp sand, not too fine, should be thoroughly mixed in a dry state.

Cement mortar of one part of cement and two parts of sand is used when a high degree of strength and density is necessary, *e.g.*, for machinery foundations, damp cellars, &c., but for mortar for masonry, plastering, and general purposes, one part cement to three parts of sand is a suitable mixture.

Cement will bear a larger admixture of sand than three to one, but as a larger proportion of sand reduces the plasticity, a small addition of lime is advisable in such instances.

Cement Plastering should not come in contact with wood, unless protected by tar paper, as otherwise the woodwork swells by absorption of water from the cement mortar, leading to cracking of the cement.

A coating of cement and a small proportion of sand may be applied for protecting ironwork from the effects of steam and gas from engines.

Salt water should not be used for stucco work, or for any work in stables, &c., exposed to the effect of ammonia.

All cement mortar or concrete should be used as quickly as possible. Set or hardened cement mortar or concrete is quite useless. Its initial "set" should not be disturbed.

Cement Lime Mortar.—This class of mortar is as yet far too seldom used. The mixture of 1 part cement, 1½ parts lime, and from 3 to 10 parts of sand, gives a mortar of great strength at a low cost.

CONCRETE.

Care should be taken to prevent the quick drying of concrete by protecting it from the direct rays of the sun and sprinkling it from time to time with water.

The best proportions for concrete depend upon local conditions, and should be chosen on the basis of experience and experiment, in accordance with the available materials.

For general purposes a mixture of 1 part cement, 3 parts sand, and 6 parts of broken stone or bricks, will produce good concrete.

All concrete should be carefully rammed.

A surplus of water should be avoided, as otherwise the strength and the density of the concrete is affected. The proportion of water is correct if only after thorough ramming the concrete liquid appears on the surface.

When placing a second layer of concrete, it is advisable to do so before the first is set; otherwise the first layer should be scratched, cleaned and wetted for securing a firm bond.

Concrete Blocks.—When moulding these, the operation should be continuous, and care is necessary to completely and tightly fill in the mould. Pork fat prevents the concrete adhering to the mould. After 24 hours the mould can be carefully removed. The casting must then be protected against sun and draught, and kept wet for some days.

Cement work should never be applied on dry or absorbent surfaces, unless those surfaces be previously wetted, and when completed must be kept moist for some time to produce the greatest strength and to avoid shrinkage and cracking.

The colour of cement work may be influenced at will by choosing the colour of the admixture. White sand or marble dust, for instance gives the finished work a lighter tint than ordinary sand.

Coloring matter may also be added to the mixture, but only such materials should be used which resist alkaline reaction.

Other coloring materials used are peroxide of iron, ultramarine, and lampblack. These materials must be well mixed with the cement before water is added.

Cement concrete must first be thoroughly dry and hard before paint is applied. It is advantageous to first put on a coat or two of water glass in 4 parts of water; when dry apply the paint.

Cement, iron, or steel, when exposed to the same temperature, expand at practically the same ratio; there need, therefore, be no fear of dislocation—cement protects iron as much against fire as against rust.

Cement is unquestionably the most fireproof material; whilst wood burns, stone splits, and iron twists, cement resists without injury the highest temperature.

The gross weight per standard cask of Portland Cement is 400lbs.

The nett weight of 3 bags, or one standard cask of Portland Cement is 375lbs., or 125lbs per bag.

One cask of Portland Cement contains about $3\frac{1}{2}$ cubic feet.

One double dray load = 9 casks.

One truck load = 32 casks.

WATER-PROOFING CEMENT MORTAR AND CONCRETE.

The effort to secure reliable results has brought a large number of nostrums on the market, some in the form of pastes to be dissolved in the mixing water, some as liquids to be used in like manner, and some as powder to be incorporated with the cement. Those best known in Australia are Pudlo, Toxement, Ceresit, and Medusa, all stocked by Sydney agents.

Pudlo is in 7lb. tins, 10/6 each, with trade discount according to quantity. One 7lb. tin will be sufficient for 2 bags of cement. Mixed dry with the cement.

Suggestion 2.

Plaster surface of green concrete with 1 of cement to 2 of sand.

Suggestion 3.

Sylvester process: Castile soap and alum in alternate coats.

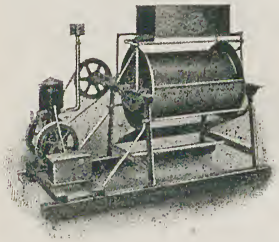
See Index.

COMPARISON OF SOLID MEASUREMENTS.

One bushel = 1.28 cubic feet.
∴ 21.1 bushels = 27 cubic feet or 1 cubic yard.
One cask cement contains $3\frac{1}{2}$ cubic feet.
Therefore **eight casks** cement contain **28 cubic feet** or **1 foot** over the cubic yard of cement.

CEMENT PRESSED BRICKS.

It may be to the advantage of a builder in suitable localities. where sand is easily procured, to make this kind of brick on the site,



Small Concrete Mixer.
Equipped with $2\frac{1}{2}$ *H.P. Gasoline Engine. Price from* £40.

Two men can make with a **9-brick machine** 4000 to 5000 bricks in 10 hours—one man mixing, and one man running the machine.

Ordinary tip-cart load of sand = 21 cubic feet.

1 cask of cement contains $3\frac{1}{2}$ cubic feet.

The above would make a mixture of about 6 to 1.

Estimated Cost of 5000 Cement Bricks.

Cement 9-Brick Machine.

Price £65.

See Advt. pages 7 and 14.

	£	s.	d.
5 loads sharp clean sand at 3/-	0	15	0
5 casks of cement at 15/- ..	3	15	0
Materials	4	10	0
Labor—2 men, 10 hours each = 20 hours at 1/3 ..	1	5	0
	£5	15	0
Wear and tear and water, add 10 per cent. ..	0	11	6
Net cost of 5000 bricks = ..	6	6	0

Cost about 25/4 per 1000 on a 9 brick machine.

Extra handling in drying, wheeling, &c., to be added.

CONCRETE.

Extracts from paper read by A. J. HART, A.M.I.C.E., *September*, 1913, *before Engineers' Association of N.S.W.*

"Concrete is primarily dependent for its strength upon the accuracy of its proportioning. Usually stone of different sizes is selected to form the bulk of the aggregate. The voids or air spaces between these stonees should be filled with sand, and the cement should coat over the whole surface of every particle of sand or stone with a film of mortar, and thus bind the mass into one compact whole. The voids in ordinary ¾in. stone, such as would be used for reinforced work, and sand varying between 40 and 50 per cent. of their bulk, and for this reason a mixture of 4 parts stone, 2 parts sand, and 1 part cement will be seen to cover the requirements of most ordinary cases, since these amounts of sand and cement will, under ordinary conditions, fill the voids to be displaced. The stone used in the work should not be all of one size, but graded down so that the smallest may adapt itself to fit in with the next larger and so on.

"Concrete attains its strength quickest when it is mixed with a minimum amount of water. For this reason a dry mixture was once thought to be the best for reinforced concrete work, and the materials were mixed with only the least possible amount of water required to set the cement. As it is, however, extremely hard to get such concrete to thoroughly surround the reinforcement, and to get a thoroughly dense non-porous concrete, the use of the dry mixtures was displaced by wetter ones, until to-day we have reached the stage when concrete is often mixed so wet that on being hoisted to the tower of a wooden frame and tipped into a flume, it flows by gravity to the portion of the work where it is required to be deposited. (*See illustration.*) With such concretes it is easy and requires but little labor to work the material around and between the reinforcing bars and to obtain a dense even face against the moulds. The resulting concrete, if properly proportioned will be waterproof with blue stone concrete.

Flume Distributor for Concrete.

"With a view to showing the comparative crushing values of concretes made from different materials results of various tests made by the writer are given below :—

TEST.—"(1) Composition of concrete : Destructor clinker 4 parts, sharp sand 2 parts, cement 1 part = 6 to 1 ; crushing value of pounds per square inch at 28 days, 1250lbs.

TEST.—" (2) Composition of concrete: Destructor clinker, 3 parts, sharp sand 2 parts, cement 1 part, 5 to 1 ; crushing value of pounds per square inch at 28 days, 1450lbs.

TEST.—" (3) ¾in. Bluemetal 4 parts, smooth builders' sand 2 parts, cement 1 part, 6 to 1 ; crushing value of pounds per square inch at 28 days, 1750lbs.

TEST.—" (4) ¾in. Bluemetal 4 parts, Nepean sand 2 parts, cement 1 part, 6 to 1 ; crushing value of pounds per square inch at 28 days, 2200lbs.

TEST.—" These tests were made more for purposes of comparison of various materials than for determining the maximum strength obtainable. The writer proceeds to give some typical examples in which prices are given for work which is being carried out in Sydney.

TEST.—" As a basis it may be taken that the approximate costs of materials required for 1 cubic yard concrete are, in Sydney to-day, approximately as under :—

BLUESTONE CONCRETE.

Example Estimate.

	£	s.	d.
1 ton ¾in. bluemetal	0	17	0
½ ton Nepean sand at 12/-	0	6	0
1⅓ casks cement at 15/-	1	0	0
Material only	£2	3	0
6 square yards timbering at 2/-	0	12	0
Labor, mixing, hoisting and placing	0	12	0
	£3	7	0
Use and waste of plant 5 per cent.	0	3	6
	£3	10	6
Contractor's profits 12½ per cent.	0	8	9
Per cubic yard ..	£3	19	3

" This figure with reinforcement may be taken for average floor work as £5 per cubic yard.

" **Arched culverts**, under a railway near Newcastle, cost approximately £5/5/- per c. yd. This price includes buttressed wing walls, but does not include for excavation.

" **A cir. reservoir**, 72ft. dia., 8ft. deep, of 4, 2, 1 blue metal concrete, at Randwick, cost £6 per c. yd. of concrete, or £5 per 1000 gallons of water stored.

" **A workshop** consisting of a two-storey and single-storey building, at Redfern, cost 4.70 pence per c. ft. of building space. This building has been constructed with 4in. walls, floors and roofs. The price given is for the building complete with all usual fittings, and includes for excavation average 2ft. deep over the site.

" These figures have been selected to cover as wide a range as possible of different types of work, and will give some idea of the economy which such construction effects over similar buildings in brick, stone and steel construction."

To Ascertain Proportion of Voids in Concrete Aggregates.

The components of concrete consist of coarse aggregate, such as gravel or broken stone, brick, clinker, &c., in pieces of varying sizes, the largest of which is determined according to the purpose of the concrete. All such aggregates, however closely packed, will contain innumerable void spaces, which will total a considerable percentage of the volume. These voids have to be filled with grit or sand to make a dense product and to obtain the full value of the cement.

Although the proportion of sand to coarse aggregate is usually specified, it may often be of importance to ascertain the approximately correct proportions needed, and the following method will be found easily applicable :—

Take an ordinary iron bucket, ascertain its exact weight empty, (call this W), fill it with water and weigh (call this W2). Then W2—W will be the capacity of the bucket as measured in water. Empty the bucket and fill it with the stone or sand to be tested for the percentage if voids, screed off evenly at top and weigh (call this W3), then pour in as much water as the bucket will take, then weight and call it W4. W3 deducted from W4 will indicate the amount of voids in the stone or sand.

To Ascertain the Percentage.

$$\frac{(W4-W3) \times 100}{W2-W} = \frac{\text{space of voids} \times 100}{\text{total capacity}} = \text{per cent. voids.}$$

As stone will absorb water it must be fully saturated before using for above test.

ESTIMATED AVERAGE VOIDS IN A CUBIC YARD,

Or 27 cubic feet of broken metal, different kinds and guages.

One c. yd.	Guage.	c. ft. Voids.
Blue metal	2½in.	contains 10
Blue metal or clean sandstone ..	1½in.	,, 11¼
Broken bricks, mixed	3in. to 1in.	,, 13½
River shingle	3in. ,, ¾in.	,, 12
Screened sandstone	2in. ,, 1½in.	,, 9

Proportion of dry material required to make 1 cubic foot of well rammed concrete in position.

	4 to 1 mix. c. ft.	6 to 1 mix. c. ft.	8 to 1 mix. c. ft.
Stone	0.80	0.85	0.85
Sand	0.40	0.58	0.58
Cement	0.25	0.182	0.137

Stone or rich lime concrete shrinks from 20 to 23 per cent.

Cement concrete from 23 to 27 per cent., compared with the loose dry materials used.

Water required in mixing a cubic yard of cement and sandstone concrete is from 30 to 35 gallons, bluestone metal from 25 to 30 gallons.

Mem.—Whenever difficult forms present themselves in buildings, such as entrances with semi-circular arches, circular on plan, or with convex jambs, &c., it will be found that cement rammed concrete, ncluding mould planking, is from one-half to one-third the cost of brickwork in cement.

MEMORANDUM.

In mixing Concrete it is just as important to select good stone, sand, and clean water as to choose a brand of cement. The most reliable stone is machine-broken basalt, which contains the largest proportion of cubical, and the smallest proportion of bruised, cracked, or chipped stone ; has at least 75 per cent. of its weight over 1½in. in size, and absorbs the least quantity of water.

WORKABLE SIZES FOR CONCRETE GAUGING FRAMES.

4ft. 6in. x 3ft. x 2ft. = 27 c. ft. or 1 yard.
3ft. x 3ft. x 1ft. 6in. = 13½ c. ft. or ½ yard.
3ft. x 3ft. x 9in. = 6¾ c. ft. or ¼ yard.

GOOD MIXTURE FOR CONCRETE.

Per Cubic Yard.

20 c. ft. broken metal, 2½ gauge.
16 c. ft. bluestone screenings, 5/16in., and dust equal parts.
1 cask of cement, or 3 bags = 375lbs.

ESTIMATE OF A CUBIC YARD OF CONCRETE.

Obtain Local Prices and add.

18 c. ft. 2½in. ballast .. ..
9 c. ft. clean stone or gravel screenings .. .. ..
7 c. ft. sand .. ..
1 cask, or 4 c. ft. of loose Portland cement .. ..
Labour in gauging, mixing, wheeling, filling and ramming, &c
Net cost ..

N.B.—This shows 27 per cent. waste or shrinkage.

Example of Cost, No. 1—Hand labour in mixing and casting concrete.

Arrangement of 6 men, viz., 4 shovel men, sprinkler, 1 ganger or trimmer.

Award wages—mixers, 10/– ; packer, 10/4 ; first grade men, 11/– ; ganger in charge of 12 men, 13/4 per day of 8 hours.

As the men work 8¾ hours per day the wages for above 6 men = 66/9 net labor only, per working day.

Average day's work of above gang 20 c. yds.

Labour only.

	Per c yd. s. d.
The **net cost**, mixing and casting only, for 20 yards of broken brick or sandstone concrete	3 6
The heavier bluestone metal is slower—15 c. yds. per day ..	4 6
Coke concrete being much lighter—26 c. yds per day ..	2 9

Add for material plant, profit, &c.

Cement floating on rough surface of concrete

And trowelling to a fair face in cement 1 to 2.

Material—One bushel of cement and two bushels of sand will cover 5 yds. ¾in. thick.

Labor—One man will float and finish 18 square yards per day, or about **two** yards per hour ¾in. thick.

CEMENT MIXTURE.

Body of floating coat usually 2½ to 1 cement.
Finishing work coat usually 2 to 1 cement.
Facing only coat usually 1 to 1 cement.

LABOR ONLY—Concrete. Per c. yd.

s. d

Labor in mixing and casting sandstone concrete within 5 yds... 3 6
Labor in gauging, mixing, wheeling, filling and ramming cement, screenings and metal concrete—turned four times 6/– to 7 6
Timbering or casing, per sq. yd. .. .. 1/6 to 2 6
Plank runs and staging, add extra per sq. yd. 1/– to 1 6

Example, No. 2—Day's work for one man—Bluestone Concrete Floors, 6in. thick.

One man can mix, wheel 20 yds., spread concrete about 5 sq. yds., 6in. thick, in 8¾ hours.

s. yd.
s. d.

Net cost of **labor** under favourable circumstances 11/3 = .. 2 3
Add **material,** bluestone, viz., one-sixth of c. yd. = (as per example, bluestone, preceding page), at £2/3/– = .. 7 2

Net cost per s. yd. 9 5

HAND BREAKING. s. d.

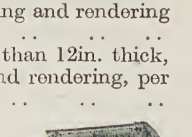
Hand-breaking brickbats or clinkers for concrete, to 2½in. gauge .. .. 2/9 to 3 6
Ditto bluestone ditto .. .. 3/6 to 4 6

Cost of Slab Concreting.

Concreting platform or landing of staircase, &c., about 8in. thick, including shoring, boarding, ramming and rendering per s. yd. 7 6
Ditto **Soffit of iron staircase,** not more than 12in. thick, including shoring, boarding, ramming, and rendering, per s. yd. 10 6

One Cubic Yard Concrete.

Will cover 12 sq. yds. 3in. thick.
Will cover 9 sq. yds. 4in. thick.
Will cover 7 sq. yds. 5in. thick.
Will cover 6 sq. yds. 6in. thick.



CONCRETING GIRDERS.

Per super yard. s. d

Concreting 3ft. face and soffit of girders, up to 8in. thick, fine bluestone, including labor, fixing, steel lathing, face and soffit mould boards, reckon from 13 0

According to quantity and length of girder.

Example, No. 3—Coke Concrete, per cubic yard. Weight: Coke, 41lbs. per c. ft., or 10 cwt. per c. yd.

£ s. d.

27 c. ft. small coke or breeze = half ton at 21/6 .. 0 10 9
12 c. ft. of sand or coke dust = good half a load at 4/6. 0 2 3
4 bags Portland cement at 5/– 1 0 0
Labor in gauging, mixing and ramming 0 2 9
Ditto wheeling and haulage 0 1 3

Net £1 17 0

Add for centering, per s. yd., 2/–.

ROADS AND FLOORS—Per Square Yard.

	£	s.	d.
Bluestone concrete, for roadways, &c., 6in. thick, per sq. yd.	0	9	6
Bluestone concrete, large areas (*see Roads*), cost per c. yd...	2	5	0
12in. thick would cost one-third as under—			
Rendering surface up to ½in. thick, 1 cement to 2 sharp river sand, per sq. yd. 5, 2 and 1, bluestone and river sand and cement, 12in. thick	0	2	3
	0	15	0
Sandstone or broken-brick concrete for **floors and hearths**, 5in. thick	0	5	0
Concrete finishing coat, in cement mortar, ½in. thick, 3 to 1	0	1	6

Fireproof Concrete Floors, composed of bluestone, broken bricks, coke or cinders, strengthened by interlaced iron bars or expanded steel network, and supported on or between rolled steel joists. *See* Re-inforced Concrete for systems. The extra cost is as follows :—

Labor—Fixing Reinforcements.	s.	d.		s.	d.
Fixing expanded steel sheets in position, per sq. yd.	0	6	to	1	0
Cost of ditto per table, from	2	2	to	4	0
Centering, *see* Index	2	0	to	2	6
	4	8	to	7	6
Iron rods or "Monier" system, fixed from ..	2	6	to	4	6

See prices Re-inforced Concrete, different systems.
Add for Rolled Joist and Haulage, per floor.

SUMMARY OF CONTRACT PRICES.

Current prices : Cement, 15/– per cask ; sand, 4/– per load ; bluestone, 14/– per c. yd. ; coke, 21/6 per ton ; lime, 5/– per bag ; broken bricks, 8/– per load ; Oregon, 18/– per 100 s. ft.

Wages : Laborers, 9/– to 11/– ; carpenters, 12/–.

	Per c. yd. £	s.	d.
Cement concrete **foundations**, 1, 2 and 5 parts brick and sandstone	1	18	0
Ditto **foundations,** 1, 2 and 5 parts bluestone ..	2	15	0
Cement concrete **floors,** brick and sandstone, 12in. thick .	2	8	0
Ditto ditto including centering 6 sq. yds. at 2/–, 12/–	3	0	0
Pier **footings** up to 3ft. sq.	2	18	0
Concrete **walling** 2ft. thick, cement 1, sandstone 5, sand- 3 parts	2	10	0
Ditto ditto 12in., per yard superficial	0	18	0
Coke concrete **floors**	2	3	0

Centering, 2/6 per s. yd.
Timbering and boarding use and waste only, 2/–.

ON EXTENSIVE WORKS.

Comparison Machine Concrete Mixers with hand labour.

W. W. Tapp, city surveyor, Port Adelaide, reports :—

A saving of £61 on hand working 363 c. yds. road foundation, or over 3/4 saved per c. yd.

Maston & Yates, builders, Sydney, laid with one machine 130 sq. yds. of concrete, 8in. thick, at Sargood Bros. new warehouse, in a day.

CENTERING FOR CONCRETE.

All centering must be true and rigid and properly braced. All joints must be fairly tight, so as to prevent leakage of the liquid mass. Waterproofing with asphalt papers or paint can be done very quickly.

The design of centering for floors between beams should be so arranged that the slab form may be removed first, and then the sides of the beams, leaving the beams or girders supported for a long time.

Bevelled strips are used to finish column and beam corners, and "fox," or bevelled wedges between uprights support and ribs or bearers, to raise boards gradually to height desired, and loosen them when concrete has set sufficiently.

Where a watertight concrete is desired, mix in the first layer soft soap and alum, in the proportion of 2lbs. soft soap and 12lbs. alum, with 30 gallons of water per c. yd. of concrete. *See also* Index for damp-proof.

Framing for concrete walls, where practicable, should be secured by long bolts through the concrete till set. The holes made by bolts to be filled in afterwards.

CIRCULAR CIRCULAR CENTERING.

To Petersham Reservoir.

3in. Segment Ribs, 20ft. span, radiating, 4ft. 6in. rise, Arches in rings, 106ft. dia., spaced 4ft. 6in., outer edge of circle, covered with 1in. x 1in. lagging to withstand double twist in laying.

	£	s.	d.
Framing machine cut sweeps into ribs, and fixing ribs in position on supporting frame, 27ft. high—			
12 ribs cost labor, making and fixing	13	10	0
Add price of materials and mill cutting	4	10	0
12 at 30/- each = ...	18	0	0
	Per sq.		
Labor—Laying down curved lagging, 1in. x 1in. and planing edges level to receive concrete, labor only	0	16	0
Nails, 4/-; add price of Oregon lagging, 30/-	1	14	0
Net cost per square	2	10	0

Cost of supporting frame for ribs and lagging, striking centering at completion, and cartage to be added.

CENTERING FOR CONCRETE FLOORS.

Centering for re-inforced concrete floors, from 2/3 to 3/- sq. yd.

CONCRETE MIXING MACHINERY.

There are many distinct kinds of concrete mixers and engines for driving same, combined and otherwise, suitable for all classes of work. The names and prices mentioned under are strictly for the *reference* and judgment of the contractor and are not intended for advertising any particular make. This is left to the agents to whom I refer. They claim to save at least 2/6 per c. yd. in cement and labor compared to hand mixing.

"Eureka," M-90, equipped with 6 h.p. "New Way" petrol engine, high tension, gear driven "Bosch" magneto, rotary pump, capacity 20 to 35 c. yds per hour, f.o.b., for £450 0 0

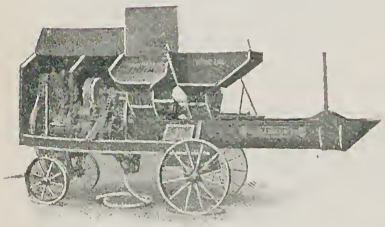
"Eureka," M-80, similar, 12 to 18 c. yds. per hour, 4½ h.p., petrol engine 300 0 0

Gasoline engine and friction clutch, with elevator 335 0 0

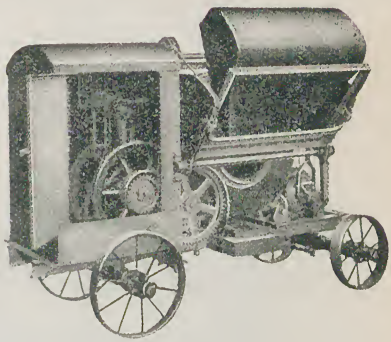
Smallest size, M-60, similar, 5 to 8 c. yds. per hour, 2½ h.p. petrol engine 250 0 0

The above are mounted on wheels complete with petrol engine.

(*See Agents' advt., page* 14.)



"Eureka."



"Chicago Special."

Chicago Cube Mixers.—Continuous batch mixers, with 2½ h.p. gasoline engine attached 2½c. ft. per batch, capacity 3 to 5 c. yds. per hour £130 0 0

"Handy," No. 6, similar, 6ft. batch, capacity 8 to 13 c. yds. 5 h.p. engine 240 0 0

The above prices are delivered and set up in running order, city or suburbs. Supplied on skids if desired.

British "Ransoms," also Chicago Special, No. 5, with elevator, in several sizes, belt driven, or steam and oil engines, complete, with automatic water-tank, and measuring charging hopper, mounted on steel road wheels, prices from £150 0 0

(*See Agents' advt., page* 6.)

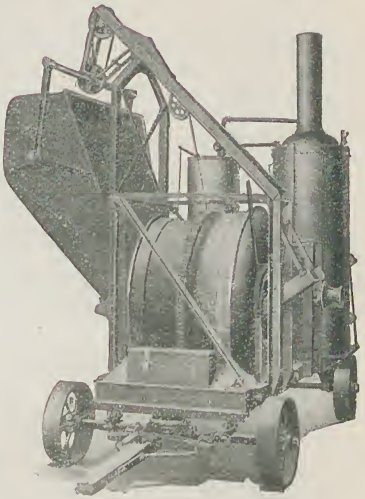
Chain Belt Concrete Mixer, with power loader, water-tank, steam or petrol, electric or belt driven, prices from £150, according to equipment.

Also concrete elevators.

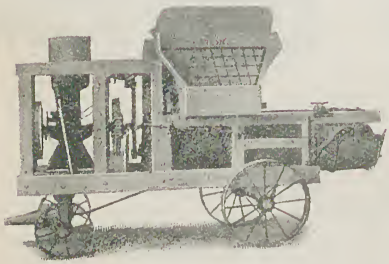
Particulars from Agents (*advt., page* 7).

Four designs of batch and continuous concrete mixers, from £25 and upwards, are stocked by J. B. Wallis & Co., Challis House, Sydney.

(*Refer to advt. page* 35.)



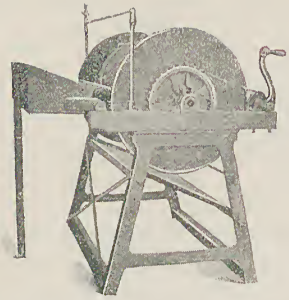
"Chain Belt Mixer."



The **Coltrin Portable** continuous self-proportioning mixing machine, operated either by hand, belt or gasoline engine power. Capacities, from 3 to 16 c. yds. per hour.

The **Milwaukee** batch concrete mixer, cast steel mixing drum, automatic hoisting bucket for feeding the mixer, also a batch hopper, driven by gasoline engine, all mounted on road wheels. Various capacities, from 4 to 120 c. yds. per hour. Price similar to other machines. Machines stocked by Australian Metal Co., agents, Melbourne and Sydney. (*See advt. pages* 9 *and* 13.)

Many useful methods of building in concrete, illustrating all systems, are explained in "Radford's Cement Houses and How to Build Them."



No. 2, "Little Giant" Mixer (Hand Power), with reverse action to discharge concrete when mixed.

Mixing capacity each batch, 3 c. ft.

Will mix from 25 c. yds. per day.

The cylinder ends are cast iron, the mixing knives removable.

Suitable for cement block and cement brick making.

(*Price, see Agents' advt., page* 7, 9, 14.)

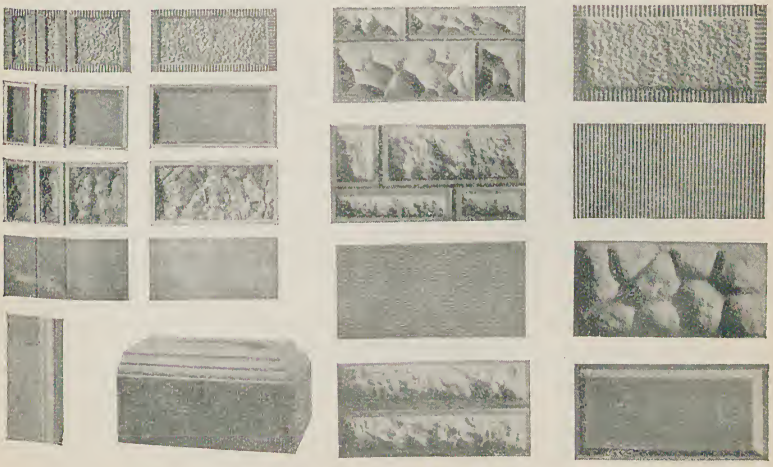
CEMENT BUILDING BLOCKS.

The cost of those ornamented faced structures varies considerably, according to the method used in construction.

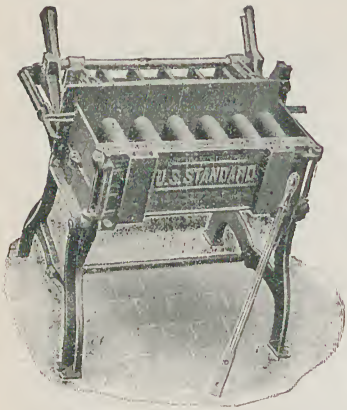
The cost can be ascertained by measuring the dimensions of concrete block, deducting material of voids in the particular block, and reckoning various materials used, and labor—mixing and casting and drying, &c.

Only a few face patterns are given below. The makers supply about 50 or 60 different designed pattern blocks, the variety being chosen as required in construction. For particulars and full catalogues of same,

Concrete Building Block Patterns.



See Agents' advt. pages 7, 14, *etc.*



Standard Concrete Building Block Machine.

	£	s.	d.
16in.	38	0	0
Ditto full equipment ..	56	0	0
24in. block machine ..	75	0	0

(*See Agents' advt., page 7, 9, 14 outside cover.*)

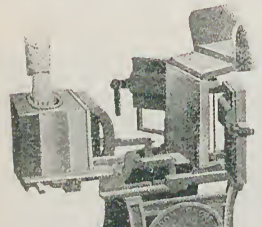
CONCRETE BUILDING BLOCK MAKING.

An ordinary 10 hours' work for two men mixing and casting 200 perfect blocks 8in. x 8in. x 16in. long — 180 s. ft. of face work — 20 s. yds.

Labor—20 hours at 1/3 = 25/–, or 1/3 per s. yd. Add for material, averaging 6in. thick with sprees in mould extracted –/6. (*See Concrete.*)

Concrete block buildings can be reinforced very simply by inserting a few bars of iron or patent brick bonding

Porch columns, concrete window caps, sills, steps, copings with different coloured quoins, arches and facings can be built as required with reinforcing rods.



"London" Concrete Building Block Machine.

With vertical acting core, face of the block in bottom of machine mould, thus admitting of coarser concrete at back portion of block.

The system of *facing* with a mixture of 2 to 1 cement and finishing with a coarser material gives the block a finished surface where required, also waterproofing same to some degree.

CONCRETE FENCE POSTS.

6ft. 6in. long, tapered 6in. to 4in x 4in. thick, re-inforced with No. 9 crimped wire. Lay mould solid and tamp concrete inch by inch around wires.

One cubic yard coke concrete at 40/– would make 27 posts. Cost per post about 1/6.

RE-INFORCED CONCRETE.

Reinforced Concrete is now an important factor in all branches of Modern Building construction.

For **twisted surfaces, suspended stairways, groined arches, domed roofs,** and many other forms of construction where lightness and strength are required ; also dams, viaducts, aqueducts, bridges, septic tanks, tanks, sewer pipes, lighthouse construction, piles, telegraph poles, railway sleepers, kerbs and gutters.

The two materials, Portland cement concrete and steel, co-operate harmoniously together, and produce a combined material stronger in tension, compression and shear strain, far superior to those of its component parts. The concrete protects the steel from corrosion and the steel strengthens the mass.

Many different systems of reinforcement have been introduced during the past few years, some simply and easily operated by the general contractor, and others requiring the expert manipulation of the specialist and the placing of one type or other of the several deformed bars manufactured for the purpose.

SYSTEMS OF REINFORCEMENTS DESCRIBED.

Monier Expanded Steel, Kahn, Hennebique, Coignet, Armoured Concrete, Ferro Concrete, and **Concrete Steel,** and many other designations are given to denote systems of strengthening concrete in regard to tensile capacity, by embedding in it steel members of special forms according to arranged methods.

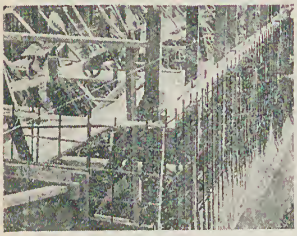
A short description of the principal systems of reinforcing introduced to the Commonwealth States, together with prices, so far as I have been able to obtain them by the courtesy of those interested, are appended :—

"The Concrete Steel" or "Monier" System (*Fig.* 1).—This was one of the earliest systems devised. It is said the name "Monier" is that of a French gardener who made a name for himself, about 45 years ago, by introducing a metal reinforcement into big pots for his plants, with the object of strengthening and reducing the bulk of his pots. It consists of steel bars placed at given distances apart and crossed at right angles with other bars wired at the intersections. A vast amount of most successful work has been done on this system in all parts of the world. It requires, however, expert designing and manipulation, consequently detailed prices for general work cannot be given, but a list of special manufactures with prices affixed will be found on the following pages.

Expanded Steel (*Fig.* 2) is made in several sizes of mesh and thicknesses of sheets, and is adopted for a great variety of purposes ; but for the reinforcement of concrete, the 3in. mesh, of suitable size strands for the strength required, is generally used. This is manufactured in sheets from 8ft. to 16ft. long by 4ft. to 8ft. wide, and in floors is laid in the largest convenient sized sheets for the purpose ; but for foundations or other special requirements, the agents supply cut to sizes. **From 2/3 to 4/9** per super yard, according to mesh and gauge on following page.

Johnson's Steel Wire Lattice (*Fig.* 3) is a mesh reinforcement formed of longitudinal wires crossed at right angles with smaller bonding wires, special provision being made for strength by the weaving of the straight tension wires along or across the roll as required. Prices per square yard **from 2/– to 3/3,** according to gauge and mesh.

SYSTEMS OF REINFORCEMENTS & THEIR ADAPTATION



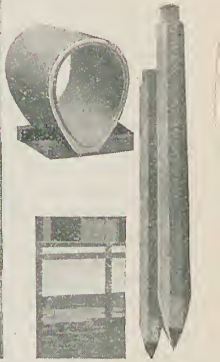
BARS IN POSITION.

MONIER AQUEDUCT.

Concrete - Steel

1

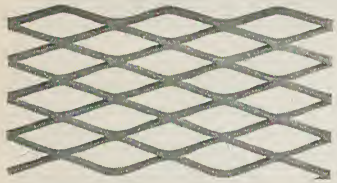
MONIER LIGHT-HOUSE,
Bradley's Head, Sydney Harbour, N.S.W



MONIER, WALLING.

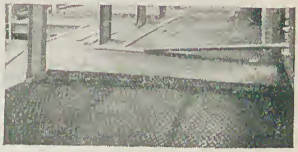
MONIER PILES.

Monier Manufactures



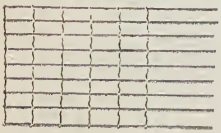
Section through Intersections.

2

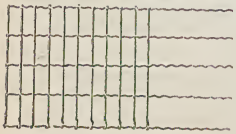


British Expanded Steel

Tension Wires Along the Roll.



Tension Wires Across the Roll.



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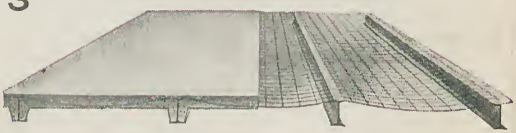
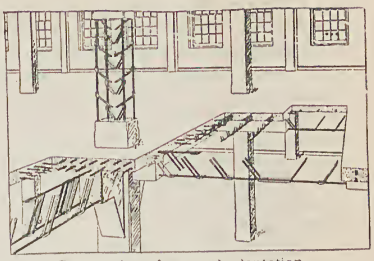


JOHNSON'S STEEL WIRE CONCRETE LATTICE.

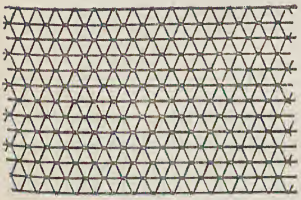
KAHN RIBBED BARS

4

KAHN TRUSSED BAR

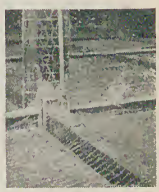


Perspective of general adaptation.



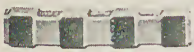
5

Reinforced Concrete Sewer Pipe



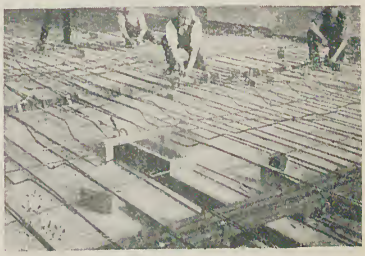
Triangle Mesh Reinforcement.

Triangle Mesh Concrete Reinforcement.



Square Bar.

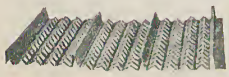
6



The Round Bar.

Round Bar.

INDENTED BAR



HY-RIB

7

HY-RIB

Clinton Wire Mesh is a somewhat similar material, with the wires electrically welded at the intersections to preserve rigidity.

The Kahn Trussed Bar (*Fig.* 4) is made of a special grade of medium open hearth steel, and is manufactured in England by the Trussed Concrete Steel Co., Ltd. The cross section has two horizontal flanges or wings projecting at opposite sides. These flanges or wings are sheared up at intervals to form the rigidly connected diagonals, making a unit of main bar and shear members.

Kahn Trussed Bars (*Fig.* 4) are used as reinforcement for **lintels, beams, girders,** etc., and all other construction where shearing force comes into play.

The Kahn Rib Bar (*Fig.* 4) is so formed as to possess a series of cross ribs, which produce a maximum grip with the concrete.

The bars are rolled from $\frac{3}{8}$in. upward varying by $\frac{1}{8}$in., and have the same weight and sectional area as a square bar of the same designation.

Kahn Rib Bars are used for **columns, floor slabs,** etc., and wherever direct tension or compression stresses are to be resisted. Prices of bars will be found on following page, but for intricate or large works special quotations and arrangements of bars specially designed by the experts responsible for the system of reinforcement can be obtained from the agents.

Kahn Ribbed Bar, price per cwt., **from 16/6.**

(*See agents advt. page* 6)

Triangular Wire Mesh (*Fig.* 5) is another reinforcing material of the same class, also of American introduction, the spacing wires being twisted round the longitudinal or tension wires in a diagonal direction to secure its desired form. Made in rolls up to 300ft. long in different widths and gauges, **from 1/6 to 3/9** per square yard.

There are variations both of wire mesh and bar reinforcements each claiming special merits, being almost daily brought on the market.

The Indented Bar System (*Fig.* 6).—This is a rod reinforcement, using, as its name indicates, a bar rolled with indents along the length for the purpose of securing mechanical bond.

The solid cross section of the steel bar is not decreased by indents.

Price **from 16/6** per cwt. small quantities.

But for complicated work special designs of arrangement of bars by expert engineers employed, together with quotations for quantities, fixed complete, will be made on application to Agents. (*See page advt.* 7.)

Chain Wire Netting Reinforcement, –/3½ to –/4 per s. foot (*see* prices Wire Worker and advt. page 11); L and T iron or ordinary bar iron, **14/– to 15/–** per cwt. (*See* advt., outside cover; *see* Ironworker.)

Hy-Ribs (*Fig.* 7) is a new metal lathing stiffened by rigid *high ribs* manufactured by the Trussed Concrete Steel Co., Ltd. The ribs and lath are made from a single sheet of steel, forming a combined unit of lath and studs. As the ribs give strength and rigidity to the material, very little centering is required. It can be curved for floors and roofs, but is used mostly for external walls, partitions, &c., and lasts longest if completely covered well both sides and protected from the air and water. Intermediate studs can be omitted in most cases. Made in sheets 8ft. 10in. x 12ft. long; also 3 gauges, 28, 26, and 24.

Price respectively, **3/–, 3/3, and 4/3** per s. yard.

(*See advt. page* 44.)

CONCRETE STEEL MANUFACTURE.

N.S.W. State Monier, Pipe and Reinforced Concrete Works (late Gummow Forrest and Co., Ltd.), 85 Pitt Street, Sydney.

Monier Pile Armour (Fig. 1) protects timber piles driven in tidal waters from the ravages of the Teredo Navalis and other marine borers.

Full section Pile Armour, type A, with bandage joint and collar joint, are employed in new structures, where they can be slipped over the pile after the operation of driving, while the half section, type B, is employed for the encasing of the piles of existing structures where the former method of armouring is inapplicable.

Armour, type A, with bandage joint, is principally used in bridge piers, and with collar, joined with a bituminous composition, is used in constructions subject to shocks.

MONIER PILE ARMOUR.

Diam.	Type.	Price per 3ft. 7in. length.	Diam.	Type.	Price per 3ft. 7in. length.
1ft. 6in.	A	0 15 0	1ft. 6in.	A	0 18 0
1ft. 9in.	Bandage	1 0 9	1ft. 9in.	Collar	1 5 3
2ft.	Joint.	1 6 9	2ft.	Joint.	1 12
	B				
1ft. 9in.	Locking Joint.	1 8 6			

Type A, horizontal joints only. Type B, horizontal and vertical joints.

MONIER BRIDGE CYLINDERS.

Monier Bridge Cylinders are manufactured in various sizes and designed to withstand an air pressure due to a 40 feet head of water. The connecting straps are built within the shell of the cylinders, thus obviating any encroachments by flanges on the working space. Connections consisting of fish plates and cotters are supplied with cylinders.

Diameter.	Price per 3ft. 7in. length.	Diameter.	Price per 3ft. 7in. length.
3ft. 6in.	£6 12 6	5ft.	£11 17 6
4ft.	8 5 0	5ft. 6in.	14 0 0
4ft. 6in.	10 10 0	6ft.	16 2 6

MONIER TIDAL FLAPS 3ft. 6in. long.

Diameter.	Pipe with Flap. each.	Diameter.	Pipe with Flac each.
1ft. 6in.	£5 0 0	3ft. 6in.	£9 5 0
2ft.	£6 5 0	4ft.	10 10 0
2ft. 6in.	7 0 0	4ft. 6in.	11 15 0
3ft.	8 0 0		

Cover plates made to any shape, dimensions, thickness, and strength. Prices on application. **Monier Concrete Pipes.** *See* Drainer.

EXPANDED METAL REINFORCEMENT.

EXPANDED METAL FOR CONCRETE FLOORS AND FOOTINGS.

It will always be desirable to get special quotations for each requirement. The present prices of the usual grades stocked in Sydney and Melbourne are as under. *See* agent's advertisement page 6.

For Floors, about 5 per cent., and for Foundations about 12½ per cent. must be allowed extra for laps of sheets.

SUSPENDED FLOORS.

When introducing the metal into floors, the following strands are generally used, being based on the proportion of metal to thickness of concrete; at least ½ per cent. metal to concrete. Double layers are employed if required.

Sizes of expanded metal, 3in. mesh, suitable for floors.

		per sup. yd. s. d.
No. 9	3/16 x 1/8, 3in. thick	2 3
8	1/4 x 1/8, 4in. ,, ...	2 9
61	5/16 x 3/8, 5½in. ,, ...	3 1
100	1/4 x 3/16, 6in. ,, ...	3 6
62	5/8 x 3/16, 8in. ,, ...	4 0
30	3/8 x 3/16, 9in. ,, ...	4 9

Stock sheets from 16ft. x 6ft. to 8ft. x 4ft. per yard super. For smaller Meshes and Strands *See* PLASTERER.

EXPANDED STEEL DIAMOND MESH.

Labour.—Fixing sheets in position, per sq. yard 3d. to 6d
Centering for concrete, per sq. yard 2/- to 2/6

Cut to Width for Foundations at per Yard Run.

3in. Mesh. Strand Weight per yd.	No. 30 ⅜ x 3/16 16lbs.	No. 62 5/16 x 3/16 12½lbs.	No. 100 ¼ x 3/16 11lbs.	No. 61 5/16 x ⅛ lbs.	No. 8 ¼ x ⅛ 8lbs.	No. 9 3/16 x ⅛ 6lbs.
Stock 3 Width	5/-	4/3	3/9	3/4	3/-	2/6
2.9 ,,	4/9	4/-	3/6	3/1	2/9	2/3
2.6	4/3	3/8	3/2	2/9	2/6	2/1
2.3	3/10	3/4	2/10	2/6	2/3	1/11
2.0	3/6	3/-	2/6	2/3	2/-	1/9
1.9	3/2	2/8	2/3	2/-	1/9	1/7
1.6	2/10	2/5	2/-	1/9	1/6	1/5
1.3	2/6	2/2	1/9	1/6	1/4	1/3
1.0	2/3	1/11	1/6	1/3	1/2	1/1

All junctions of sheets in foundation must lap one full mesh (8in.), long way of mesh, and 3in., short way of metal, and at intersecting walls must cross completely. The metal should be laid about 2in. from botton of concrete, thoroughly embedded, and the concrete well rammed or trodden down.

WIRE LATTICE REINFORCEMENT.

Johnson's Wire Lattice (*Fig.* 3), for floors, walls, silos, tanks, is manufactured in rolls, to any length by any width up to 8ft. 6in, with special tension and binding wires, woven to form a rectangular mesh. The tension wires are straight and the binding wires crimped. Either of the wires can be woven in the length or width of the sheet or roll.

Table of Johnson's Wire Lattice.—Special Concrete Meshes.

No.	Mesh.	Gauge of Wires.	Weight. per sq. yard.	per sq. yd
7	1½in. x 3in.	13 x 13	2.6lbs.	2 0
8	1½in. x 3in.	11 x 11	4.0lbs.	2 4
9	1½in. x 3in.	10 x 10	4.9lbs.	2 9
10	2 in. x 4in.	6 x 11	6.4lbs.	3 0
11	1½in. x 3in.	6 x 11	8.6lbs.	3 6
*12	2 in. x 4in.	3 x 11	10.1lbs.	3 9
20	1½in. x 3in.	7 x 11	7.6lbs.	3 3

Note.—No. 12—To ensure flexibility for one No. 3G wire, a group of four No. 10G is used, having the same sectional area.

TO CARRY A SAFE WORKING LOAD OF

1½ cwts. per ft. Superficial.			3 cwts. per ft. Superficial.		
No. of Lattice used.	Centre to Centre of Support.	Thickness of Concrete.	No. of Lattice used.	Centre to Centre of Support.	Thickness of Concrete.
No. 12	15 feet	7½in.	No. 12	11 feet	7½in.
No. 12	14 ,,	7in.	No. 12	10 ,,	7in.
No. 20	13 ,,	6½in.	No. 20	9 ,,	6½in.
No. 20	12 ,,	6in.	No. 20	8 ,,	6in.
No. 20	11 ,,	5½in.	No. 10	7 ,,	5in.
No. 10	10 ,,	5in.	No. 10	6 ,,	4½in.
No. 10	9 ,,	4½in.	No. 8	5 ,,	4in.
No. 8	8 ,	4in.	No. 7	4 ,,	3in.

(For special quotations for quantities, see Advt., p. 11.)

KAHN BARS.

Kahn Trussed Bars (*Fig.* 4).

Nos. ..	1	2	3	4
Inches ..	½	¾	1	1¾
Price, per ft. run ..	4d.	7¾d.	1/2	1/8

Kahn Ribbed Bars.

Sizes—inches ..	¾	½	⅝	¾	⅞	1
Weight per ft. lbs...	.48	.86	1.35	1.95	.265	3.45
Sectional areas, sq. in.	.1406	.250	.391	.562	.766	1.00

Prices, per cwt., from 16/6. See Agent's advt., p. 6.

TRIANGLE MESH.

Triangle Mesh Re-inforcement (*Fig.* 5).—In rolls up to 300 feet long. In widths of 26in., 42in., and 58in.

Longitudinals Spaced 4 inch Centres, Cross Wirse Spaced 4 inch. Centres. Number and Gauge of Wires, and Weights per 100 Square feet.

Style Numbers.	No. of Wires Each Long	Gauge of Wires Each Long	Gauge of Cross Wires.	Approx. Weight pr 100 s. ft.	Per Square yard.
				lbs.	s. d.
28	1	10	12½	34	1 6
23	1	¼	12½	72	3 0
32	2	5	12½	92	3 9

DRAINER.

Glazed Earthenware Pipe Drains are measured at per foot run.

To include digging and filling in trenches at 4/– per c. yd., to average depth of 3ft.

Labor laying to include jointing in cement, 3 to 1.

Skilled labor, 1/3 per hour.

LAID COMPLETE PER FOOT RUN.

Internal Dia. inches.	Lin. feet per ton.	Sydney price. Per ft.	Excavation.	Laying and jointing.	Total cost.
		s. d.	s. d.	s. d.	s. d.
3	280	0 4	0 4	0 2 —	0 10
4	200	0 4½	0 4½	0 3 —	1 0
6	106	0 7	0 5½	0 4½ —	1 5
9	64	1 0	0 6	0 6 —	2 0
12	48	1 6	0 8	0 9 —	2 10
15	36	2 3	0 9	0 10 —	3 10
16	32	3 0	0 9	1 0 —	4 9
18	24	4 0	1 0	1 3 —	6 3
21	18	8 0	1 2	1 6 —	10 8
24	15	12 6	1 3	1 9 —	15 0

Single junctions, sloping or square (*Fig.* 5 and 6), Tapered pipes (*Fig.* 3 and 4), bends or elbows (*Fig.* 9, 10, 11), 66 per cent. extra.

Double junctions (*Figs.* 7 and 8), 100 per cent., or double the price.

Drain pipes laid in sandstone-concrete, reckon double prices for 4in. and 6in. pipes.

Excavation.—This item is reckoned 3 ft. deep by required width including filling and ramming over pipes at 3/– per c. yd. The cost of any other depth up to about 7ft. may be seen from this : If at the same price per c. yd., 5ft. deep will be about double, and 7ft. deep about treble the price, on account of extra width at top required to lay the pipes.

Cutting for drains through sandstone rock, for pipes, add extra on above table :—4in. G.E. pipes, –/9 ; 6in., 1/1 ; 9in., 1/3 ; 12in., 1/6 per foot run to 2 ft. drop.

Pipes tested by Melbourne Metropolitan Board of Works.

4in. pipes, 1/– ; 6in., 2/– ; 4in. bends, 1/3 ; 6in., 3/– ; 4in. junctions, 2/– ; 6in. junctions, 4/–.

12in. Brick Surface ddDrains, bed in sand and grouted in cement, 1/– per foot run.

Brick on edge against wall for asphalt drainage, –/4 per ft. run.

SANITARY FITTINGS.

Cast iron Inspection Box (*Fig.* 18), each, 2/–.
Discs, earthen-ware, each, 4in., –/1 ; 6in., –/2 ; 9in., –/6 ; 12in., –/9.
Gully Sink, with grate, 6in., 4/– ; 8in., 5/– ; 10in., 6/– ; with inlets, –/6 extra.
Gully Sink (*Fig.* 19), with grate, P Trap shape, 6in., 6/– ; 8in., 8/– ; 10in., 10/–.
Gully Sink and grate, swivel top, 8in., one inlet, 8/6; two inlets, 9/– ; three inlets, 9/6.
Gully Raiser for 6in. and 8in. gully, each, 1/– ; 10in., 2/– ; with inlets, –/6 extra.
Gully Sink (*Fig.* 22), square, with grate, 9in., 6/–.
Hopper Pan and trap, tested, W. & S. Bard, 8/6.
Grease Trap, approved, W. & S. Bard, £2/10/–.
P Trap (*Fig.* 17), plain, 3in., 2/– ; 4in., 3/– ; 6in., 5/–.
P Trap (*Fig.* 13), 6in. low set, 5/– ; long, with inlet, 5/6.
P Trap, 4in., with inlet, 3/6.
P Trap (*Fig.* 14), 9in., 4/–.
Buchan Trap (*Fig.* 15), 4in., 7/6 ; 6in., 12/6 ; 9in., £1/10/–
Syphon Trap (*Fig.* 16), 4in., 4/6 ; 6in., 6/9 ; 9in., £1/5/–.
Sinkstone, dished, 18in. x 18in. x 4in., each, 5/–.
Inspection Pipes (*Fig.* 12), 4in., 2/– ; 6in., 3/6.

Labor, setting traps and sinks, each, 1/6.

MATERIALS.

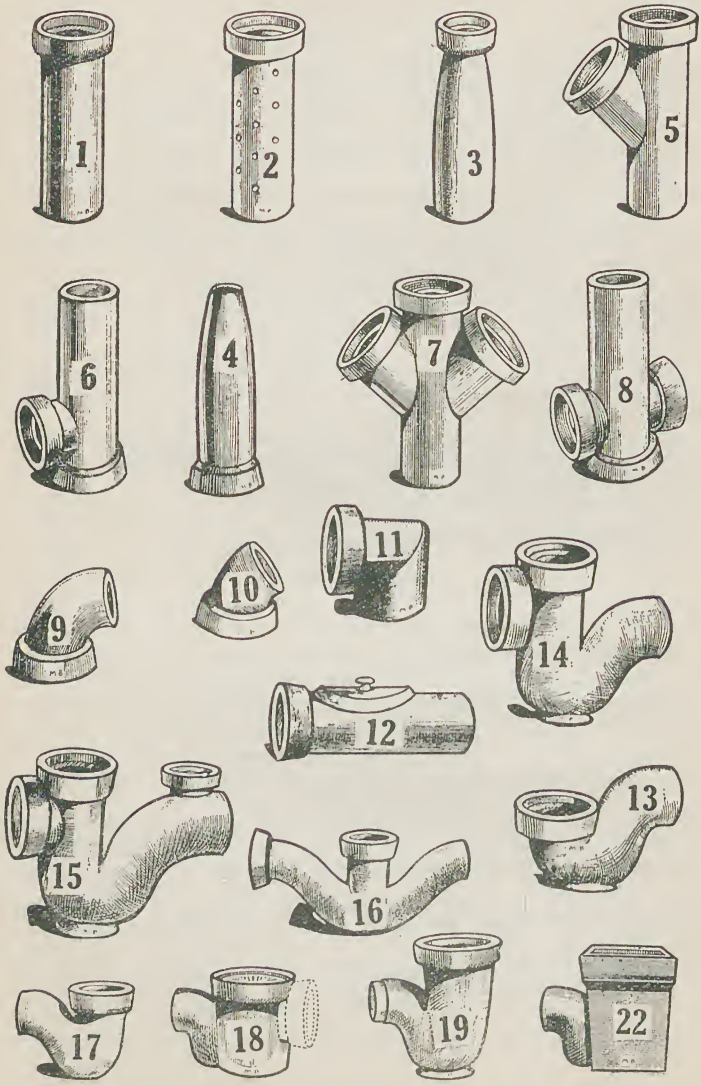
The cost of the pipes delivered in the cities. Reckon :—
For Perforated Pipes (*Fig.* 2), 25 per cent. more than ordinary.
Channel or Half-pipes, 4in., –/4½ ; 6in., –/6.
Channel 4in. U Tiles, flat bottom, 12in. long, per 100, 25/–.

Agricultural Drain Pipes.

Sydney and Melbourne.

Size.	Weight per 1000.	Price per 100.	Gutter Bricks.	Gutter Tiles One foot lengths. per 100.
inches.	tons. cwt.	£ s. d.	inches. pence	£ s. d.
2	1 9	0 6 0	3 3	1 0 0
3	2 5	0 10 0	4 4	1 7 6
4	3 5	0 15 0	5 5	1 15 0
6	6 0	2 5 0	6 6	2 2 6

Cartage extra up to 10/– per load, about 1/– per mile.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Drain Testing and Clearing Appliances.

Cylindrical Air-bag "Stopper," with 6ft. of air tube and cock—2in. dia., 7/–; 2½in., 8/–; 3in., 10/–; 4in., 14/–; 5in., 15/–; 6in., 16/–7in., 17/–; 8in., 18/–; 9in., 20/–; 10in., 22/–; 12in., 28/–; 15in., 36/–; 18in., 42/–; 21in., 60/–; 24in., 76/–; 27in., 96/– each.

Add 25 per cent. on to prices in Australia.

Air Pumps, hand, 10/– each.

Lever arm for applying interceptor stopper, 15/–.

Drain Rods, light cane, £4 to £6 per 100ft.

Drain Rods, Malacca cane, brass screw junctions, with straps, per 100ft., from £5 to £7.

6in. Scrapers, 7/6; Plungers, 6/–; Archimedian Screw Cleaners, 3in., 5/–; Whalebone Drain Brushes, 4in. to 12in. dia., 15/– to 20/–.

WEIGHTS AND FREIGHTS.

N.S.W.

G E Drainpipes.

3in. dia.	150 per ton.	}	1 ton C Rates.
4 „	100 „	}	
6 „	60 „		Less than 15 cwt. 1st class rates.
9 „	34 „		
12 „	24 „		In 5 ton lots in 4-wheel truck, B rates; 6 ton about 2/– per ton for each 10 miles.
16 „	15 „		
18 „	10 „		
24 „	7 „		

Agricultural Pipes.

2 „	800 „		Miscellaneous rates about 1/2 per ton each 10 miles for full trucks.
3 „	360 „		
4 „	200 „		
6 „	125 „		

Garden Tiles.

700 per ton, A rates.

Gutter Tiles.

250 per ton, A rates.

T.C. Air Bricks.

300 per ton, 2nd class rates, about 1/6 per ton each 10 miles M rates full truck, 1/2 per ton each 10 miles.

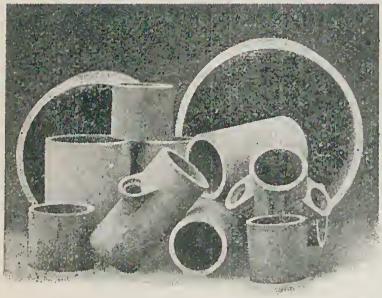
Flower, Chimney, or Earthenware **Pots**, B rates full trucks.

Shipping Rates N.S.W. Coast from Sydney.

About –/4 for 4in. pipes; –/6 for 6in. pipes, &c.

Or quotations for quantity per ton or bulk, insurance to be paid and arranged with insurance office by consignor.

MONIER PIPES.



STATE MONIER WORKS.

(late Gummon, Forrest, Ltd.)

All Pipes are guaranteed to be of the standard specified by the various Government Departments.

List prices subject to discount. Discount on application.

Quotations delivered rail, wharf, or within 5 miles of our works, Erskineville.

CIRCULAR PIPES.

Internal Diameter.	Price per lin. foot.	Approx. cost of laying, per foot run.
ft. in.	£ s. d.	s. d.
6 0	2 0 0	3 0
5 6	1 14 6	2 3
5 0	1 9 0	2 0
4 6	1 4 0	1 9
4 0	1 0 0	1 6
3 6	0 16 6	1 3
3 0	0 13 0	1 0
2 6	0 10 0	0 9
2 0	0 7 3	0 7
1 9	0 5 7	0 6
1 6	0 3 7	0 5

OVIFORM PIPES.

Internal Dimensions.	Price per lin. foot.	Approx. cost of laying, per foot run.
ft. in. ft. in.	s. d.	s. d.
3 6 x 2 4	15 6	1 6
3 3 x 2 2	13 0	1 3
2 9 x 1 11½	10 9	1 0
2 5 x 1 9	8 9	0 9
2 1 x 1 6½	7 0	0 7
1 9 x 1 4	5 3	0 6
1 6 x 1 1	3 10	0 5
1 3 x 0 10	2 7	0 4

Excavation and other items not included. For further information and estimates for quantities laid complete, *see advt. page* 16.

KIELBERG DRAIN PIPES.

Australian Patents held by Richard Taylor, 31 Queen Street, Melbourne, and Marrickville, Sydney.

These pipes can be manufactured in large quantities on site, thereby saving cartage to outlying districts, which would be considerable on stoneware pipes. Kielberg's Patent Cement-Concrete Pipes, are manufactured by machinery under pressure, and give excellent results in practice.

Net Prices per lineal ft. at the Works, Marrickville, Sydney.

Diameter.	Weight, per ft.	Square Butt Ends.	Spiggot and Socket Joint.	
4in.	12lbs	—	4d.	2ft. lengths
6in.	20lbs.	5d.	6d.	3 feet lengths.
9in.	34lbs.	8d.	9d.	
12in.	56lbs.	1/1	1/2	
16in.	84lbs.	1/9	2/–	
18in.	100lbs.	2/3	2/5	
21in.	124lbs.	3/2	3/3	
24in.	146lbs.	3/9	4/–	

Junctions and Branches, price and a half. Ends, 6in., 10d. each 9 n., 1/9 each.

Reinforced Cement-Concrete Pipes.

Net Price per lineal ft. at the Works, Marrickville.

Diameter.	Weight per foot.	Square Butt Ends.	Spiggot and Socket Joint	
9in.	42lbs.	1/2	1/3	3 feet lengths.
12in.	64lbs.	1/9	1/10	
16in.	90lbs.	2/1	2/4	
18in.	116lbs.	2/8	2/10	
21in.	140lbs.	4/–	4/3	
24in.	160lbs.	4/3	4/6	
27in.	178lbs.	5/9	—	
30in.	195lbs.	6/6	—	
36in.	280lbs.	9/6	—	
42in.	360lbs.	11/6	—	4 feet lengths.
48in.	440lbs.	14/6	—	
60in.	500lbs.	21/–	—	
72in.	770lbs.	27/–	—	

Branches—Price and a half. For quotations for quantities, laying complete, see Manufacturers' advt., page 35.

Extra for Culvert Ends.

Diameter up to 1ft. 6in., 3/–; 2ft., 7/–; 2ft. 3in. 8/–; 2ft. 6in., 9/–; 3ft., 12/–.

Test for the Victorian Railways, June 15th, 1910 :—Inter. dia. of pipe, 24in., three months made. Span, 18in. clear, with bearings 6in. wide. Test Concentrated Load, 6,317lbs. Deflection, 1/64in.

OVIFORM PIPES.

Net Price per lineal ft. at the Works, Marrickville.
Cartage to be added.

Int. diam.	Price, per lin. ft.	Int. diam.	Price, per lin. ft.
ft. in. ft. in.	s. d.	ft. in. ft. in.	s. d.
1 3 x 0 10	2 3	2 5 x 1 9	7 6
1 6 x 1 1	3 0	2 9 x 1 11½	9 0
1 9 x 1 4	4 3	3 3 x 2 2	11 0
2 1 x 1 6½	5 9		

Length of Pipe, 4ft. Prices include Wire Netting and Scrim for Joints.

Flat Oval Pipes, reinforced for road crossings, made in halves, also splayed ends, in 3ft. and 4ft. lengths. Half can be used as an open channel, or with a flat cover. Size, 15in. x 9in. — 3/3 per ft. run. 18in. x 12in. — 4/6 per ft. run.

Reinforced Concrete Plates.

Length of Plate ..	3ft. 9in.	4ft. 9in.	5ft. 9in.	7ft.	8ft.	9ft.
Thickness of Plate ..	2¾in.	3½in.	4½in.	5in.	5¾in.	6¾in.
Price, per ft. run ..	3/3	5/–	7/–	9/9	12/6	15/6

Door Lintels, 6in. x 4½in., 1/– per ft. to 5 feet; above that special quotations.

EXCAVATED DRAIN TRENCH.

Actual cost of work done.

Example of cost of excavating Drain Trench, 6 x 1ft. 6in., 4ft. sandstone, 2ft. soil, employing choppers at 9/– per day of 6 hours; blacksmith and boy for sharps; compressed pellet blasting powder, used estimated quantity 166 cubic yards, cost £32/14/–, or 4/– per cubic yard.

SUNDRIES.

ASPHALT WATER PIPES.

Patent Steel Re-inforced Asphalt Water Pipes, made all sizes, from 3in. to 18in. diameter, and for light or heavy pressure of water; in 9ft. lengths, with patent clip collars. The advantages claimed—Acid and alkali proof, non-corrosive and rust proof. Half the weight of cast iron, and two-thirds the cost. For further particulars apply Patent Asphaltum Co., N.S.W. (advt. p. 5.)

Bitumen Pipe Joints. G.E. Sewerage Pipes, Melbourne City Council, have in some instances been jointed with coal tar, bitumen and blue stone dust mixture, sold in blocks at £7 per ton, by the Neuchatel Asphalt Co. 10lb. brick will do two joints of a 9in. pipe.

Wood Stave Pipes. *See* Index.

ARTESIAN SURFACE WATER DISTRIBUTING DRAINS.

N.S.W. Government Works Report, June, 1905.

Distributing earth drains, to carry bore water from Artesian Wells at Coonamble, Walgett and Moree, mostly black, sticky soil, or red soil of the Plains. Total cost, including equipment, from £6/10/– to £12/15/– per mile, or 1½d. to 4d. per cubic yard, the drains containing about half a cubic yard for every running yard.

Double-sided Plough Drain Maker (Higgin's Patent).—Makes drains in earth 54 x 16, at the rate of 4 or 5 miles per day, or varying widths and depths as required. *Labour required.*—One teamster and lad as offsider; 20 horses. Team guide machine. *Construction.*—Very strong and simple. Raising and lowering gear regulates depth or lifts clear for transport. Drains can be cleared at the rate of 10 miles per day. £40 to £75 each.

CLEARING ROADS OR DRAINS.

(Through Ti-Tree Scrubs).

Scrub-Cutting Roller, drawn by bullocks walking on fallen scrub. Worked with side draught. 10ft. roller, with knives, cuts about 8 acres per day, according to thickness of scrub and size of block. Saves about 25/– per acre. Scrub is cut twice and burns up clean ready for ploughing. Ti-tree sticks up to 4 inches in diameter can be smashed down and cut. Rollers made in sizes to suit. Prices and particulars on application. From £8 Meadow Bank Works, Sydney.

ELECTRICAL.

The prices under this heading are based on the present Customs tariff, so any alteration in rate must be allowed for.

A brief explanation of some of the **Electrical terms** commonly used will be found useful to readers.

ELECTRICAL TERMS.

Current denotes **flow** of electricity along a conductor.

Volt is the unit of **Electro motive force**, E.M.F., the force or pushing power, or difference of potential.

An electro motive force which would cause a current of one ampere to flow through a resistance of one ohm.

Ampere.—The quantity of current flowing through, or the rate at which electricity passes a given point in the conductor.

Watt, or **Volt-Ampere**, signifies the value of output being amperes x by volts.

K.W. or **Kilowatt**—1000 watts, 1000 watts—1 unit. Unit is the gauge by which electricity is charged.

Ohm.—The practical unit of resistance in the conductor tending to impede the flow of current.

Megohm—1,000,000 ohms.

Resistance.—That property of an electric conductor by which it opposes the passage of an electric current.

Insulator.—All substances which resist the passage of electric current are termed insulators, such as glass, slate, marble, vulcanite, mica, and indiarubber.

Positive is signified by the sign plus and **Negative** by minus.

Horse-power—33,000 foot pounds per minute.

Brake Horse-power—the available H.P. at the pulley.

Electric H.P. (a rate of electrical performance)—746 watts.

R.P.M. revolutions per minute.

A.C.—Alternating current—an abb. expressing a current having a periodical change in direction.

D.C., Direct Current (also called Continuous Current), a current flowing in the same direction only.

C.P.—Candle-power.

"**Candle Foot**"—a unit of illumination equal at a distance of one foot to that which is given out by a standard British candle.

Circuit Breaker.—A device serving to open or break a circuit.

Closed Circuit.—A circuit completed.

D.P. Switch.—An abb. for double-pole switch.

S.P. Switch.—For single pole.

Fuse.—An incombustible box containing a safety fuse.

Holophane.—A glass with a tentaform external surface employed for the better diffusion of the light emerging from an enclosed source.

Short Circuit.—A connection between two parts of a circuit which connection is of low resistance compared to the intercepted portion of a shunt or by-path.

Tension-High.—A term not properly used, signifying eletromotive intensity, also electro-motive force, which should be designated by their proper terms.

Transformer.—An induction coil by which a primary current of high initial electro-motive force is made to produce a secondary current of low initial electro-motive force.

CHARGES FOR SUPPLY OF ELECTRIC POWER.

Rates in Sydney and Suburbs.

Lighting, 4½d. per unit.
Power, 1½d. per unit.

A useful example showing how to calculate cost of electricity consumed :—

All elec. apparatus has a fixed rating, shown in watts, viz. : a 50 candle-power lamp consumes 60 watts **per hour** (electrical ratings are usually shown or reckoned at per hour consumption)

. . 60 watts per hour, current at 4½d. per 1000 watts or 1 unit, equals 60 x 1000 x 4½d., or approximately 1⅓d. per hour for 50 c.p. lamps. (*Metal Filament*).

ELECTRIC SUPPLY STATIONS.

It is not generally known that electricity is available for the public in the following places :—

New South Wales.

Albury.
Ballina.
Broken Hill.
Cobar.
Deniliquin.
Dungog.
Goulburn.
Gunnedah.
Hillgrove.
Inverell.
Manly.
Moree.
Mossvale.
Narandera.
Newcastle.
North Sydney.
Penrith.
Sydney and suburbs.
Tamworth.
West Maitland.
Wickham.
Windsor.
Young.

Victoria.

Ararat.
Bairnsdale.
Ballarat.
Bendigo.
Beulah.
Birchip.
Camperdown.
Casterton.
Charlton.
Donald.
Dronin.
Eaglehawk.
Euroa.
Footscray.
Geelong.
Hamilton.
Hopetoun.
Horsham.
Inglewood.
Kerang.
Kilmore.
Koroit.
Kommburra.
Mildura.
Melbourne.
Sunbury.
Swan Hill.
Wodonga.
Yarrawonga.

Queensland.

Brisbane.
Charters Towers.
Rockhampton.
Toowoomba.

COMBINED PETROL ENGINE DYMANO SETS—£50.75.

Dynamos coupled to high speed petrol engine, including Switchboard Regulator.

B.H.P.	Output of Dynamo K.W.	Number of 16 c.p. lamps	Exclusive of Accessories Price £.
1.5	.40	24	106
2.75	1.	60	142
4.	2.	120	209

These sets can also be used for driving circular saws or other machines when dynamo is not charging accumulators.

ELECTRIC MOTORS (Direct Current.)

110, 240, 480 Volts, D.C.

Horse Power.	Speed	Machine with Pulley.	Slide Rails.	Starter.
		£ s. d.	£ s. d.	£ s. d.
¼	1500	8 0 0	0 10 0	1 1 0
½	1000	11 2 0	0 15 0	1 1 0
1	1400	12 10 0	0 15 0	1 2 0
1.5	1500	15 0 0	1 0 0	1 6 0
2	1350	19 0 0	1 2 6	1 6 0
3	1500	21 2 0	1 2 6	1 12 0
4	1600	23 6 0	1 5 0	2 4 0
5	1650	25 0 0	1 5 0	2 10 0
5	1280	29 0 0	1 6 6	2 10 0
7.2	1450	32 4 0	1 7 0	4 0 0
10	1600	40 0 0	2 0 0	4 18 0
12	1450	44 10 0	2 0 0	5 18 0
15.5	1500	48 18 0	2 0 0	7 2 0
17.5	1270	61 0 0	2 5 0	8 2 0
21.5	1530	61 0 0	2 5 0	8 2 0
21.5	1250	66 0 0	2 5 0	9 0 0
25	1400	66 0 0	2 5 0	9 0 0
27	1300	71 10 0	2 5 0	9 18 0
30	1500	71 10 0	2 5 0	9 18 0

(Alternating Current.)

Three Phase 415 Volts, 50 Cycles, A.C.

H.P.	Full Load Speed	Eff. %	Motor with Pulley Squirrel Cage	Motor with Pulley Slip Ring	Slide Rails	Starter
			£ s. d.	£ s. d.	£ s. d.	£ s. d.
0.5	1420	77	7 15 0	—	0 11 6	—
1.	1420	81	9 5 0	15 15 0	0 13 6	3 18 0
1.5	1425	83	10 10 0	16 5 0	0 13 6	3 18 0
2.	1425	85	11 13 0	17 10 0	0 13 6	3 18 0
3.	1440	86	14 15 0	20 10 0	0 13 6	4 15 0
5.	1440	87	19 9 0	27 0 0	0 13 6	5 11 0
7.5	1440	88	34 0 0	41 10 0	1 2 0	7 5 0
10.	1440	88	40 2 6	47 5 0	1 2 0	9 9 0
12.5	1450	88	47 2 6	55 10 0	1 2 0	10 10 0
15.	1450	88	50 0 0	61 0 0	1 2 0	11 12 0
20.	1450	88.5	55 10 0	66 10 0	1 14 6	12 0 0
25.	1450	89	66 15 0	77 12 6	1 14 6	13 10 0
30.	1450	90	72 5 0	83 5 0	2 5 0	15 10 0
40.	1460	91	89 0 0	100 0 0	2 5 0	16 10 0
50.	1460	91.5	100 0 0	111 0 0	2 5 0	17 10 0

THE SYDNEY MUNICIPAL COUNCIL

Hire Motors to Clients at the following rates from January 1st, 1914 :—

These rates include insurance.

Alternating-Current Motors. Squirrel Cage Rotor Type.

Standard sizes.

B.H.P.	Rate per month. £ s. d.	B.H.P.	Rate per month £ s. d.
½	0 3 0	6M	0 14 7
1	0 3 5	6S	0 18 1
2	0 4 7	8M	0 15 11
3	0 7 1	8S	1 0 5
4	0 8 5	10M	0 18 0
5	0 8 8	10S	1 0 11
6	0 10 11	12M	1 1 0
8	0 11 11	12S	1 4 2
10	0 13 6	15M	1 2 0
12	0 15 10	15S	1 4 5
15	0 16 6	18M	1 3 5
18	0 17 7	18S	1 8 8
22	1 0 8	22M	1 7 7
25	1 1 3	22S	1 9 0
		25M	1 8 4
Speed 940 or 1420 R.P.M.		25S	1 16 5

These rates include insurance.

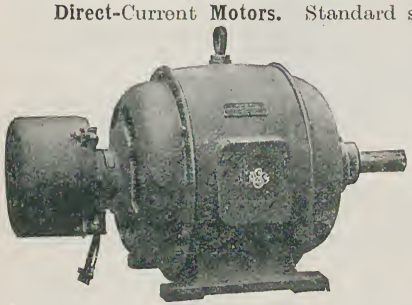
Alternating-Current Motors. Phase Wound Rotor Type. For heavy starting duty.

B.H.P.

Note.—**M** — Moderate speed about 1420 R.P.M. Rate per month.
S — Slow speed about 940 R.P.M. £ s. d.

These rates include insurance.

Direct-Current Motors. Standard sizes.



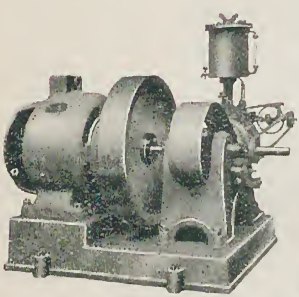
B H.P.	Rate per month. £ s. d.	B.H.P.	Rate per month. £ s. d.
½M	0 4 0	5M	0 9 5
1M	0 5 1	6M	0 11 4
2M	0 6 1	6S	0 13 2
3M	0 8 10	8M	0 11 8
4M	0 9 2	8S	0 13 6
		10M	0 13 6
		10S	0 16 2
		12M	0 14 0
		12S	0 16 7
		15M	0 16 7
		15S	0 19 1
		18M	0 19 3
		18S	0 19 6
		22M	1 0 11
		22S	1 3 3
		25M	1 2 6
		25S	1 5 10

Note.—**M** — Moderate speed (over 1000 R.P.M.).
S —Slow speed (under 1000 R.P.M.).

Hire and Maintenance of Arc Lamps.

Type of Lamp.	Hire. Rate per month. s. d.	Maintenance. Rate per hour per Lamp Burnt. d.
Ordinary Open Type	1 4	0.6
Enclosed Type	1 6	0.25
Flame Type	1 10	0.8
Transformer	1 10	

The hire of lamp does not include hire of transformer for Flame or Open Type Arcs.



VERTICAL PARAFFIN ENGINE DYNAMO SET (Self-Lubricating).

These engine sets can also be used for driving circular saws or other machines when dynamo is not charging accumulators.

COUNTRY HOUSE LIGHTING.

Oil consumption $\frac{3}{4}$ to 1 pint oil per break power per hour.

Russian oil is slightly better than American for this purpose, but the specific gravity should be .8 with a flash point at about 80° to 100° Fah.

PELTON WATER WHEELS.

Head of Water, 90ft.

Size of Wheel. in.	H.P.	Cubic Feet.	Price unmounted. £	Cast bed plate, cover & stop valve. £	Weight cwt
30	9	73	65	110	25
36	14	109	80	130	38
42	19½	150	110	180	62
48	25	196	140	230	80
60	40	314	160	270	95

BOOK TO RECOMMEND.

Modern methods of switch control for electrical wiring, refer to W. Perren Maycock, M.I.E.E., on "Small Switches and their Circuits."

A.E.G. Insulating Testing Sets, price £10/10/– each.

ELECTRIC LIGHTING.

Indoor lighting requires according to purpose from 2 to 5 candle power per 10 square feet.

Outdoor lighting, ditto, ½ to 2 candle power per 10 square feet.

Indirect and **semi-indirect lighting** is becoming popular owing to the softness and better diffusion of light.

Cost.—The electric installation is usually quoted for at **per point.**

Prices, according to system adopted, range from 17/6 open wiring, 25/- enclosed wiring in plain conduit to 35/- per point in screwed conduit tubes, including plain cord pendants and lamps (carbon filament). Add 2/- per point for M.F. lamps.

Power points for heating apparatus, fans, &c., from 30/- per point.

INSULATED WIRE.

	£	s.	d.
110 yds. Insulated Wire, 20 gauge, india rubber, D.C.C. covered	0	4	0
110 yds. Insulated Wire, 18 gauge, D.C.C. ,, ...	0	7	0
Twin Flexible Cord, silk covered, for hanging pushes, per yard	0	0	2

ZINC TUBING—For conveying Wire.

	s.	d.		s.	d.
¼in. diam., per 100ft. ...	2	9	⅜in. diam., per 100ft. ...	4	0
5/16in. diam., per 100ft. .	3	6	½in. diam., per 100ft. ...	5	6

Beaded Bell Wire Cover—Kauri, per 100ft. 6 0
Leclanche Batteries, for above, per cell, each 1 6
Dry cell from 1 0

PUSHES.

	s.	d.
2½in. wood, per doz., 8/- ; 3in. wood (best cocus), per doz. ...	10	6
3in. China, white and gold, each, 1/- ; 3in. brass, flat back, each	1	3
3in. brass, flat back, each, 1/3 ; 3in. barrel, watertight, each...	2	6
4in. brass flat back, 1/9 ; 4in. brass barrel, watertight, each ...	4	6

CONDUIT—For Casing Electric Wires.

Close Joint—½in., 5/- ; ⅝in., 6/- ; ¾in., 7/- ; 1in., 12/6 ; 1¼in., 20/- ; 1½in., 30/- per 100 feet.

Screwed, Brazed, or **Welded Joint**—Double above figures.

ARC LAMPS.

Enclosed Type for Long Burning. **Direct** Current.

	£	s.	d.
Single or double enclosure, for parallel burning, 100–150 volts	4	0	0
4 to 6 amps., complete with line resistance, 100 hours, each	4	15	0
For **Series** burning on 200–250 volts, 5.5 amps., 100 hours, each	4	0	0
For **Parallel** burning on 200–250 volts, double carbon lamp, complete with line resistance—			
Single or double enclosure, 3.75 amps., each	4	0	0
Fancy copper covers for above, extra, each	0	15	0

ALTERNATING CURRENT.

Enclosed Type to Burn Singly, or two in series with Balancer.

	£	s.	d.
7.5 amps., 100 hours, lamps, each	5	0	0
Balancer, each	2	10	0
Open Type, 16 hours, 10 amps —			
Line resistance for above, each	0	12	6
Flame Type	6	15	0
„ „ Magazine	9	0	0
Carbons, for open or enclosed types lamp, per pair ...	0	0	2

The metal filament lamp is almost universally used for indoor lighting, and is fast replacing the arc lamp for outside illumination.

INCANDESCENT LAMPS (Carbon and Metal Filament).

	s.	d.
Best English make, low voltage carbon to 8, 16, 25 c.p., per doz.	8	0
Continental made lamps, 8, 16, 25, 32 c.p., per doz.	6	0
M.F. lamps, 100–120 volts, up to 50 c.p., each...	2	6
„ 120–240 volts, each	3	0

FITTINGS.

	s.	d.
Plain pendant, with ceiling rose, flexible cord, shade and holder, each 2/6 to	3	0
Counter balance pendant, ceiling rose, flexible cord, porcelain counter weight, with shot, fitted with—		
10in. opal shade and holder, each, from	4	6
3 light plain spider fitting only, each	3	0
3 light fancy do. do., each	5	0
3 light fancy pendants, each, from	10	0

All fitting over 2lbs. weight must have auxiliary support.

ELECTROLIERS.

	£	s.	d.
3 light plain brass, 4ft. stem, each, from	1	5	0
5 light do. do. each, from...	2	0	0

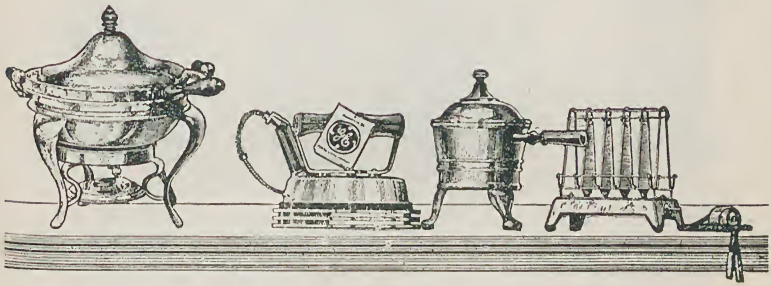
For copper, bronze, or oxydised silver finish, add 25 per cent.

WALL BRACKETS.

	£	s.	d.
9in. plain swan neck, ⅛in. tube, each		1	6
12in. fancy, plain brass, ⅛in., from		4	6
2 light do. do. each, from		10	0

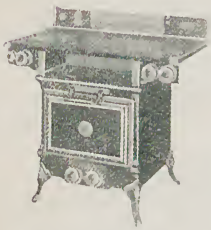
TABLE STANDARDS AND NEWEL LAMPS.

	£	s.	d.
12in. plain standard, with gallery shade and holder, each, from	0	7	6
Fancy do. do. fancy shade and holder, each, from	0	12	6
Newel standard, 3 light, 4ft. p. brass, 1in. stem, each ...	5	0	0
Bronze figures standard, 12 light, ornamental	4	0	0
Ditto do. do. 18 light, each	6	0	0



HEATING APPARATUS.

	£	s.	d.
Glow Radiators, cast iron, black Japan finish—			
2 light, £2; 3 light, £3; 4 light	4	0	0
Ornamental hammered copper, 2 light, £4; 3 light, £4/10/–;			
4 light	5	0	0
Laundry Irons, 7lb., with flexible cord, 100–240 volts, each	1	0	0



	£	s.	d.
Soldering Irons, with detachable copper bit, each	1	10	0
Kettles, polished copper finish, from—			
2 pint, £1; 3 pint	1	5	0
Glue pot, for workshop, each ...	1	5	0
Electric ovens, prices according to size, each, from	3	10	0
Electric ovens, 8–10 persons, with 3-ring top	15	0	0
Hot Plates	0	17	6
Toaster	0	15	0

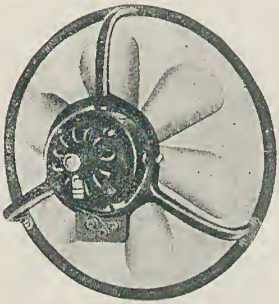
ELECTRIC FANS.

	£	s.	d.
Desk or Wall—			
200–250 volts, 12in., each £3; 16in., each	4	10	0
Oscillating, add 25 per cent.			
Two Blade Cabin Fans—			
26in. sweep, £4; 36in. sweep ...	5	0	0
Ceiling Fans—			
Four blade, Japan finish, 56in. sweep	5	5	0
Ditto, copper, oxydised 56in. sweep ...	6	0	0
Speed regulators for ceiling fan, 6 speed, each	1	5	0

See advt. page 25.

Exhaust Fans, with **Motor attached**—	£	s.	d.
12in. blades, air displacement 1100 c. ft. per min. ...	6	3	0
18in. blades, air displacement, 2200 c. ft. per min. ...	13	13	6
24in. blades, air displacement 4000 c. ft. per min. ...	26	17	6
36in. blades, air displacement 12,000 c. ft. per min. .	50	0	0

Glow Radiator.



Water Motor Fans, 12in. blades, 30lb. sq. inch pressure, each	3	0	0

ELECTRIC BELLS—For House or Factory Use.

	Per point fixed. £	s.	d.
All wires cased in zinc tubing, with indicator...	0	15	0
With fixed wall or hanging pear bushes, best quality ...	0	17	6
Accessories— BELLS.	£	s.	d.
3in. gong, ordinary quality, 2/6 ; best quality, 5/– ; 6in. each	0	17	6
Continuous action, for alarm, 3in. gong, each	0	10	0
Burglar Alarm, window and door contracts, each ...	0	1	6
Ditto. gate and outdoor use watertight each ...	0	2	6
Portable bell sets, with flexible cord, for sick rooms, &c., each	1	0	0
Indicator Pendulum movement, per way	0	2	0
Ditto do. with mechanical replacement ...	0	2	6

TELEPHONES AND TELEPHONETTES.

Internal Office, fixed transmitter and separate receiver, to work up to ¼ mile line, battery ringing ... each	1	7	6
House telephone, fitted with combination receiver and transmitter ... ... from each	0	17	0
Ditto do. fixed transmitter, kitchen type... ...	0	11	0

The above may be used in conjunction with existing bell line.

LONG DISTANCE TELEPHONE.
Wall Pattern.

Half to 2 miles, two magnet generator...	2	10	0
Ditto, 2 to 100 miles, as used by Government...	4	10	0
Portable Telephones, for boundary riders, rifle ranges ...	5	10	0
C Batteries, for telephones, " Leclanche," complete, per cell	0	1	6
Mining Telephones, watertight and gas proof case	6	10	0
Inter-communication system for warehouses, fitted complete **with switches,** per telephone	2	10	0

GOODS LIFT.

Direct Coupled Electric Lifts—"Sprowson's."

Speed.—90ft. per minute, to travel 50ft.
Car.—Steel frame, lined with match boarding.
Gear.—Placed overhead. Hand-rope control.
Ropes.—Flattened Strand. H.W. Runners for Cars.

Load. cwt.	Size of Car.	Well.	Price. F.O.B. £	Extra per ft. £	Extra below gear.
5	3′ x 3′	4′ x 3′9″	280	10	25
7½	4′ x 4′	5′ x 4′9″	320	15	27
10	5′ x 5′	6′ x 5′9″	335	15	29
15	5′6″ x 5′6″	6′ x 6′3″	372	15	42
20	6′ x 6′	7′ x 7′	454	20	46
30	6′6″ x 6′6″	7′6″ x 7′6″	560	20	50

PASSENGER LIFTS.

Add 10 per cent. on above Table.

Speed, 180ft. per minute. Travel, 50ft. Car, Steel, Suspension Cradle Flat Rope Strand. H.W. Runners.
Cabinet work, £65 extra. Gear overhead. Hand-rope control.
Switch in Car control, £30 extra. S drive, 4 ropes, 2 conveyance sheaves.
Push Button control, £90 extra. Position of balance weight at back of lift.
Per Floor, £10 to £15 extra.

HYDRAULIC LIFTS.

For 50ft., speeds from 60 to 300ft. per minute.
Goods lifts, to lift 5cwt. to 2 tons, £100 to £300
Passenger lifts, do. £130 to £400
Fittings according to design and situation, extra.

CONTRACTORS' CRANES.

For Electric or Steam Power.

The **Electric Crane** is clean, light, and more easily set up compared with the heavier steam crane. Always ready for work; no extra time of engineer required before starting or after ceasing work.

The power is only used when actually in motion.

An electric 7-ton crane, if lifting 1 ton, only uses units of power in proportion. A unit being equal to 1⅜ h.p.

The City Council's fee for Electric Power in Sydney is 1½d. per unit per hour.

All motions are taken from one motor (totally enclosed series wound type), and for **large works** many cranes can be supplied with power from a central generating station, at a saving of fuel and labour, which fact generally applies to electricity and when used as a power otherwise.

See advt. pages 9, 14 *and outside cover.*

ELECTRIC CRANES (by J. Garrick & Sons, Edinburgh).

To lift Tons.	Length of Jib.	Weight. Tons.	Price without Jib.	Extra for Steel Mast.	Extra for Steel Jib.
2	60	7	£250	£10	£68
3	60	10	275	12	68
4	70	12	296	14	74
5	70	13	350	16	90
7	70	16	424	18	93
10	70	21	500	20	111

CONTRACTORS' STEAM CRANES.
Without Jibs or Woodwork.

Tons.	Jib.				
5	70	—	£320	£10	£90
7	70	—	425	10	90

A 7-ton Steam Crane generally consumes 1 to 1½ tons of coal per week.

ELECTRIC PORTABLE JIB CRANE.
To work 14ft. Radius (gauge from 3ft. 6in. wide.)

To lift tons.	Price.	Travelling gear extra.
2½	£485	£20
3	528	20
5	625	25

OVERHEAD GANTRY TRAVELLING CRANES.
To Lift 20ft. (single lift motor.)

5 tons Traveller, 50ft. span, price £500
5 tons do. 3 phase motor, price 600

ELECTRIC LOCOMOTIVE.
For haulage, contractors' or mining trucks.
(Goodman's Rack Haulage Equipment for Steep Grades.)

Capacity, 3 ton, Class B £650
Capacity, 5 tons, Class BB 925

ELECTRIC ENGINE ("Invincible," Mort's Dock Co.)

	£	s.	d.
8 h.p. **Stationary Type,** for saw mills, complete ..	120	0	0
Magneto, extra	4	10	0
Electric Centrifugal Pumps, combined, 4in., from ..	56	0	0

PORTABLE ELECTRIC HAULAGE GEAR.
Mounted on 4 Wheels.
Continuous Current or 3-phase Motor and Controller.

Diam. of Drum. inches.	Width of Drum. inches.	Depth of Flange. inches.	Speed of Motor. R.P.M.	Price of drum with claw clutch.	Price with motor and controller.
18	10	5	850	150	170
18	12	5	750	188	210
18	14	5	1000	203	230
30	14	7	950	240	265

Add 10 to 15 per cent. for Australian States.

See Electrical advt.

EXCAVATOR.

Foundation trenches should be kept separate, and estimated apart from other building excavation. Take the full length and width of bottom footings; multiply by the depth from surface. By reference to Table, the cubic contents of length and width by one foot deep can be ascertained at a glance. Then multiply by the depth required.

This Table is also useful in finding capacity for square tanks, sinking, or other excavation, by multiplying and adding.

SOLID OR CUBIC MEASURE.

1,728 cubic inches .. .. = 1 cubic foot
27 cubic feet .. .. = 1 cubic yard

WEIGHT OF EARTHS AND ROCKS.

Per Cubic Yard.

		cwt.			cwt.
1 cub. yd.	Earth weighs	26	1 cub. yd.	Sandstone, weighs	36
1 ,,	Sand weighs	30	1 ,,	Marl, Clay or Shale	38
1 ,,	Ironstone Gvl.	36	1 ,,	Quartz	41
1 ,,	Quartz Gravel	30	1 ,,	Trachyte ..	43
1 ,,	Clay	31	1 ,,	Granite ..	43
1 ,,	Mud, wet ..	35	1 ,,	Slate	44

A FAIR DAY'S WORK FOR A NAVVY—8 HOURS.

Pick and Shovel work:—3 to 5 cubic yards stiff soils; 7 to 10 cubic yards ordinary loams; 10 to 16 cubic yards sandy soils.

An ordinary tip cart, empty, weighs 10cwt., and holds about 23 cubic feet loose shale, or 12 cubic feet in the solid; thus taking $2\frac{1}{4}$ loads to the cubic yard in the solid; usual filling about 5 loads to 2 cubic yards solid.

Ten navvy barrow loads to the cubic yard.

INCREASE OF EARTH WHEN EXCAVATED.

Rock or shale increases in bulk from the solid about double; therefore, to obtain the price for leading per cubic yard in cutting, reckon about $2\frac{1}{4}$ times the above prices.

For hard clay, loam, gravel, conglomerate, and similar dense materials, reckon $1\frac{3}{4}$ times the above prices.

If miners trucks on rails are used, there will be a saving in the loading, because of the less height the stuff has to be lifted. If the leads are short, say less than 4 chains, barrowing with planks will be still cheaper, the height of the barrows being even lower than the miners trucks.

CARTAGE PER ONE-HORSE LOAD.

Horse, dray, and driver, 1s. 7½d. per hour.

	s.	d.
Carting, tipping, and levelling, *lead* not more than quarter mile, per cubic yard	0	9
Ditto, from quarter to half mile *lead*, ditto	1	3
Add for every etxra half mile, ditto ditto	0	9
Filling earth spoil, carting 1½ miles and tipping, per load ..	2	6
Ditto, white hard metal in spawls, loaded and delivered 3 miles	4	0

(Along metalled road.)

Ordinary single horse drays contain about 18 bushels, or 23 cubic feet.

RAILWAY AND EXTENSIVE WORKS.

In the following Tables on Excavation, the earth, rock, etc., excavated are reckoned in *situ*, *i.e.*, in its undisturbed and natural state.

Cuttings and Embankments.—In equalising the contents of cuttings and embankments for roads, railways, &c., it is not usual to make any allowance for the increased bulk of loose material, except in increasing the height of the embankments for settlement, the extent of which will depend upon the material, rock settling down the least and wet clay the most ; it is always considered favorable to the contractor to pay him for embankments, if he has taken the work by the cubic yard.

Proportion of getters, fillers, and wheelers, for run of 40 yards.

	Getters.	Fillers.	Wheelers.
In loam, earth, sand, gravel, clay, &c.	1	1	1
Hard earth, or gravel, marl, &c. ..	1	2	2
Hard clay, loose shale, &c.	1	1¼	1¼
Rock, if blasted, or broken up, from	3	1	1

MEASUREMENT OF EARTHWORK.

In the measurement of cuttings and embankments with slopes, the common system of average heights gives less, and the common system of average areas gives more than the true contents ; the proper system is by the *prismoidal formula*, from which the annexed table for the measurement of earthwork is calculated, but even in this case the cross section is presumed to be perfectly level, the slopes to be quite true, and the change from chain to chain regular and gradual, otherwise the measurement is incorrect.

To show the necessity of correctly ascertaining the cubical contents of earth-work, where the contractor tenders for a *lump* sum, I have taken the following from M'Neil's Earthwork Tables, which are calculated from the *prismoidal formula* :—

"In calculating the contents of embankments and cuttings in a section, the true content of which is 332,390 cubic yards, by the common methods of mean heights is only 310,652 cubic yards, thus making 21,738 cubic yards less than the true content ; by the common method of mean areas the error in excess will be 43,487 cubic yards."

Prismoidal Formula.—Average area equal to four times the middle area added to the sum of the end areas and divided by six. In using the following constants instead of dividing the sum of the areas by six, multiply them by the following constants for the length required in hains :—

CONSTANTS FOR ESTIMATING.

Cuttings and Embankments.

Sum of areas in feet mutiplied by			0·204	—cubic yards in		¼	chain.
,,	,,	,,	0·408	,,	,,	1	,,
,,	,,	,,	0·612	,,	,,	1½	,,
,,	,,	,,	0·815	,,	,,	2	,,
,,	,,	,,	1·223	,,	,,	3	,,
,,	,,	,,	1·630	,,	,,	4	,,
,,	,,	,,	2·037	,,	,,	5	,,
,,	,,	,,	2·445	,,	,,	6	,,

The ends of cuttings on sidelong ground always form a pyramid, for which multiply the area of the base by one-third the length.

In light or shallow cuttings and embankments for railways, roads or tramways, the common average area will be sufficiently near for tendering, as it gives an excess in measurement in proportion to the inequalities of the heights. If the heights are given at every chain, "Bidder's Tables" will give the readiest and most correct measurements to the nearest foot in height, if the cross section of ground is tolerably level.

Earthwork, Rock, &c, at per cubic yard. **Excavators at** 1s., horse, dray and driver at 1s. 6d. per hour.

Lead in yds.	Light Soil.	Loam.	Heavy Soil.	Stiff Clay.	Shale.	Hard Rock.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
33	1 0	1 2	1 3	1 6	3 2	5 0
67	1 1	1 3	1 4	1 7	3 4	5 2
100	1 2	1 4	1 5	1 8	3 6	5 3
150	1 3	1 5	1 7	1 10	3 8	5 5
200	1 4	1 6	1 8	1 11	3 10	5 7
250	1 5	1 7	1 9	2 0	4 0	5 8
300	1 6	1 8	1 10	2 1	4 2	5 10
350	1 7	1 9	1 11	2 2	4 4	6 0
400	1 8	1 10	2 0	2 3	4 6	6 2
450	1 9	1 11	2 1	2 4	4 8	6 4
500	1 10	2 0	2 2	2 6	4 10	6 6
600	2 0	2 2	2 4	2 8	5 2	6 10
700	2 2	2 4	2 6	2 10	5 6	7 2
½ mile	2 6	2 8	2 9	3 2	6 2	7 6
1,000	2 7	2 9	3 0	3 4	6 6	7 9
1,200	3 2	3 3	3 4	3 8	6 10	8 1
1,500	3 8	3 9	3 10	4 3	7 4	8 8
1 mile	4 2	4 3	4 4	4 9	8 0	9 2
1¼ ,,	4 8	4 10	5 0	5 7	8 9	10 0
1½ ,,	5 4	5 6	5 8	6 4	9 6	10 10
1¾ ,,	6 0	6 2	6 4	7 0	10 3	11 8
2 ,,	6 10	7 0	7 2	7 8	11 0	12 6
2¼ ,,	7 8	7 10	8 0	8 4	11 9	13 4

Reckon extra for existing wages.

N.B.—The first two or three items to be removed by wheelbarrows. The whole is an open cutting, the shale and hard rock including explosives.

The Average Weight of Sandstone is about 15 cubic feet per ton in place, or 36cwt. per cubic yard, and as it increases about four-fifths in bulk in removal, a solid cubic yard will be about two single horse loads. In bluestone, granite, or marble it will be about two tons, or fully two loads.

A barrow load will be about two cubic feet.

SURFACE WORK.

PER SUPERFICIAL YARD, INCLUDING TOOLS, Etc.

Wages, 1s. per hour.

	s. d.		s. d.
Levelling made earth not more than one foot deep			0 2
Surface forming for roads not more than 9 inches deep, in earth, hard clay, &c.	0 3	to	0 4
Ditto do. in rock	0 9	to	1 0
Soiling slopes of embankments and cuttings ..	0 4	to	0 6

TURFING.

Turfing, removing, and re-laying grass turf ..	1 0	to	1 5
Getting and carting sods, 1 mile	0 7	to	0 9

Ploughing up surface of ground at **20s. per acre**, is equal to 1½d. per rod, or .05d. per sup. yard ; at 40s. per acre, equal to 3d. per rod, or ½d. per cubic yard.

Different rates for ploughing per acre can be reckoned in proportion.

MEASUREMENT OF AN ACRE OF LAND.

IN SQUARE ANGLE BLOCKS.

Width	Length	Width	Length	Width	Length	Width	Length
Feet.	Feet.	Feet	Feet.	Feet.	Feet	Feet.	Feet.
20	2,178	120	363	210	207	320	136
30	1,459	130	336	220	198	340	128
40	1,085	140	312	230	189	360	121
50	875	150	290	240	181	380	114
60	725	160	272	250	174	400	109
70	622	170	250	260	167	450	96
80	545	180	242	270	161	500	87
90	484	190	224	280	155	550	79
100	436	200	218	290	150	600	73

MODERN RAILROAD CONSTRUCTION.

Extract from article in the Sydney "Sun," November, 1913.

"ACROSS AUSTRALIA."

Speedy Track-layers.—The new track-layers enable us to do the work with a third of the labor formerly employed by old systems, with an increase in the mileage rate of from 0.75 to 1.5 per day. Under the old system a depot is created near the rail-head, and trucks carrying material are discharged there, the rails and sleepers being conveyed later by hand or horses to the head of the track.

The new system (imported from the United States) does away with depots. The materials on the construction trains are run out direct to the rail-head, the sleepers and rails are carried along by automatic process to the spot where they are to rest. The track-laying machine forms part of the train at the leading end, the locomotive at the rear end pushing the train along as the rails are laid.

The track-layer is operated by a vertical stationary engine, the steam is provided through a pipe from the locomotive. Conveying apparatus is attached to each side of the train for its whole length, in the form of a trough with rollers along the bottom. These rollers are operated by the track-laying engine and produce practically the same effect as an endless belt. Sleepers are conveyed along one side of the train, while on the other side the rails are carried. The track-laying machine itself has two jibs projecting in front, the longer one being used for sleepers, and the shorter one for the rails.

Sleepers are taken from the longer jib and laid on the formation, a rope being stretched along the formation to indicate the exact position of the ends of the sleepers. Thirteen sleepers are laid to each rail length, and while these are being placed in position navvies are engaged in getting out the rails and preparing to drop them on the sleepers as soon as the latter are laid. The small section is then secured, the train moves on 33ft., and the same process is repeated. Thus is the first trans-Australian line steadily lengthening out.

CARTAGE, PER TON.

	s. d.
Cartage on bad roads, per ton, per mile, over 15 miles ..	1s. to 2 0
Ditto, on goods roads ditto ditto ..	9d. to 1 0

RAILWAY FREIGHTS.

Haulage on Railway, cheapest rates, ditto	1d. to 1½d.

Per ton per mile.	Mis.	A	B	C	1st.	2nd.
1 to 10 miles .. about	1/6	2/–	2/6	3/9	4/9	5/6
200 miles .. about	¾d.	1½d.	2d.	2⅝d.	3⅝d.	4 7/10d.

Freight by coasting steamers do. do. .. .. .. ¼d.

A horse can draw about 8 tons on an ordinary railway, and 4 tons on a **horse-railway**, with 6 x 3 hardwood rails.

EXCAVATOR'S WORK.

Per cubic yard, including plant, explosives, etc.
Wages, 1/1½ per hour.

	s.	d.
1. Sand or loose soil, shovel work (getting and casting only) ...	0	6
2. Hard ditto, or loam pick and shovel work, ditto	0	9
3. Wet mud, sand, or silt, getting and casting	0	11
4. Getting and casting, or filling into drays, earth, &c., not more than six feet deep, *pick and shovel work*	1	2
5. Ditto, from 6 to 12 feet deep, ditto	1	6
6. Ditto, from 12 to 18 feet deep, ditto	2	0
If in stiff clay or hard gravel add to items 4 and 5 ...	0	3
If in soft rock or loose boulders, add ditto	0	7
If in hard sandstone or shale, add ditto	1	5
If in compact bluestone or trap, add ditto	2	9
If in compact granite, gneiss, or sienite, add ditto	4	6
If wheeled one *run* of 20 yards, add	0	3
Ditto for every additional *run*, add	0	3

N.B.—If the excavation is from the face of an open cutting, the cost will be the same as if not more than 6 feet deep as per 4th item. This work is facilitated by partly undermining and then wedging down with iron bars or *feathers*.

Items 5 and 6 are only used when the earth is raised to the surface in lifts, as in cellars or basements, gasholders, &c. If these holes are large enough, the best way is to cart the stuff by a spiral road, gradually descending towards the bottom and then raise the earth, &c., forming the temporary road, by lifts or barrows with planks.

In excavating for covered Reservoirs on hills, the gullets, or tunnels, required for the inlet and outlet pipes may be used as inclines for the removal of the earth, shale, &c., from the side of Reservoir and afterwards for carting the materials, &c., required for the lining, into the Reservoir.

The prices for excavating include the use of plant on a small scale, but if expensive plant has to be bought for one contract only, it would not pay at these prices.

HAND LABOUR EXCAVATION PRICES GENERALIZED.

Excavation in Earth, including wheeling 40 yards, spreading, levelling, filling in and ramming	2	0
Ditto, trenches, ditto, in trenches 2ft. to 4ft. wide ...	2	6
Excavation in Sandstone, including wheeling, 35 yds.	8	6
Ditto ditto with blasting	6	3
Ditto, ditto, large areas and good face	5	6
Channelling in Sandstone, per foot super., wages 1/6 per hour	1	3
(*Machine Channelling or Guttering.—See Quarrying.*)		
Levelling and scabbling in Sandstone, bottom of trenches, per foot super.	0	6

Reservoir dams from "Molesworth."—Width at top in low dams should be equal to the height. Breast or inside slopes, 3 to 1; back slopes, 2 to 1. Height above surface of water not less than 3½ feet.

Getting and raising coal (thick seams), per ton, from 3/6 to 6/–.
(Machine Undercutters not used.)

PLOUGH AND SCOOP WORK.

A plough, with four horses or six bullocks and two men, at 46/- per day, will loosen from 200 cubic yards at a cost of 2¾d. per cubic yard.

Two horses drawing a ½ cubic yard scoop at 31/- per day will remove 54 cubic yards generally, depositing earth 50 feet, at about 7d. per cubic yard, ploughing and scooping, 9¾d. per cubic yard of earth, it all depends upon the distance earth is deposited.

For instance :—**A square tank** in hard black soil of the plains, 80 feet square at the top, 40ft. square at bottom, battered sides, 10 feet deep, containing 14.00 cubic yards, cost £85, or about 1/2½ per yard.

Another tank, soil 120 feet x 12 feet deep, 60 feet bottom, 48 feet battered sides, slopes 1ft. in 1ft., containing 2,200 cubic yards ; 6 bullocks, with plough and scoop, going through the hole backward and forwards, and depositing soil each end on bank, 10 yards from edge, cost £110, or about 1/- per cubic yard.

PLOUGHS, SCOOPS AND SCRAPERS.

3-wheel Scoops.—Are great labour-savers for hauls not exceeding 5 chains. Said to be 20 per cent. cheaper than tip carts for removing Cost from, 9 cubic ft., £15 ; 24 cubic ft., £21 each.

Heavy Road and Tank-making Ploughs, from £15.

Drag Scoops for short hauls.—Improved Skid Scoops, 2ft. wide, £8 ; to 4ft., £14 ; with bars or chains.

Little Giant Wheel Scraper, on two Sarven wheels, 31in. diameter, £15. This scoop lifts clear of ground. For rough tracks ; for pair of horses.

"Columbus" and "Minnesota" Solid Steel Drag Scraper, 7 cubic ft., £4 ; 5 cubic ft., £3 10s. ; and 3½ cubic ft., £3. Weight, 100 to 80lbs.

See Grading Machines—Roads.

TO MEASURE EXCAVATED TANK.

To ascertain the contents of a tank with sloping sides, add the superficial area in feet at the top to that at the bottom, and four times half-way down batter. Divide by 6 and multiply by the depth ; result = the cubic contents in feet, multiply this by 6¼ to find the number of gallons tank would hold.

FOUNDATION, TRENCHES, TANKS.

	s.	d.
Getting out trenches for foundations of walls for buildings, levelling and stepping ; bottom part refilled and rammed, and the remainder spread as required per cubic yard ...	2	6
Ramming ground in layers around wall in embankments, add to above prices	0	6
Forming open tanks or waterholes for sheep or cattle, up to 12 feet deep in clay, battered sides (plough & scoop work)	1	3

Special Excavation, as under, cost :—A Curved Trench, 20 feet radius, with plumb picked sides, sunk in hard shale, containing iron-stone bands for water-main pipe—

7ft. x 6ft. x 8ft. deep = 336 cubic feet = 12½ cubic yards, actual cost, 5/- per cubic yard.

8ft. x 6ft. x 5ft., straight, cost 3/- per cubic yard.

Filling in above, and ramming in 6in. layers, 1/6 per cubic yard.

For Stone Excavation—*see* **Mason and Quarrying.**

NUMBER OF CUBIC YARDS IN FOUNDATION TRENCHES, CONCRETE, OR EXCAVATED WORK FOR EVERY FOOT DEEP.

Results in Cubic Yards and Decimals.

Length Trench in feet.	WIDTH OF TRENCH.														
	inches.				feet.										
	12	15	18	21	2	2½	3	3½	4	5	6	7	8	9	10
6	.2	.2	.3	.3	.4	.5	.7	.8	.9	1.1	1.3	1.5	1.7	2.	2.2
7	.2	.3	.4	.4	.5	.6	.8	.9	1.	1.3	1.5	1.8	2.	2.4	2.6
8	.3	.3	.4	.5	.6	.7	.9	1.	1.2	1.5	1.8	2.	2.4	2.6	3.
9	.3	.4	.5	.6	.7	.8	1.	1.2	1.3	1.6	2.	2.4	2.6	3.	3.4
10	.3	.4	.5	.6	.7	.9	1.1	1.3	1.5	1.8	2.2	2.6	3.	3.4	3.7
11	.4	.5	.6	.7	.8	1.	1.2	1.4	1.6	2.	2.4	2.8	3.2	3.7	4.1
12	.4	.5	.6	.7	.9	1.1	1.3	1.5	1.8	2.2	2.6	3.	3.5	4.	4.4
13	.5	.6	.7	.8	1.	1.2	1.4	1.7	1.9	2.4	2.9	3.4	3.8	4.3	4.8
14	.5	.6	.7	.9	1.	1.3	1.5	1.8	2.	2.5	3.1	3.6	4.1	4.7	5.2
15	.5	.6	.8	.9	1.1	1.4	1.7	1.9	2.2	2.7	3.3	3.9	4.4	5.	5.5
16	.6	.7	.9	1.	1.2	1.5	1.8	2.	2.3	2.9	3.5	4.1	4.7	5.3	5.9
17	.6	.7	.9	1.1	1.3	1.6	1.9	2.2	2.5	3.1	3.8	4.4	5.	5.7	6.3
18	.6	.8	1.	1.1	1.3	1.6	2.	2.3	2.6	3.3	4.	4.6	5.3	6.	6.6
19	.7	.8	1.	1.2	1.4	1.7	2.1	2.4	2.8	3.5	4.2	4.9	5.6	6.3	7.
20	.7	.9	1.1	1.3	1.5	1.8	2.2	2.6	2.9	3.7	4.4	5.2	5.9	6.6	7.4
21	.7	.9	1.1	1.3	1.5	1.9	2.3	2.6	3.1	3.9	4.5	5.3	6.2	7.	7.8
22	.8	1.	1.2	1.4	1.6	2.0	2.4	2.8	3.2	4.1	4.9	5.7	6.5	7.3	8.1
23	.8	1.	1.2	1.4	1.7	2.1	2.5	2.9	3.4	4.2	5.1	5.9	6.8	7.6	8.5
24	.8	1.1	1.3	1.5	1.8	2.2	2.6	3.	3.5	4.4	5.2	6.1	7.1	8.	8.8
25	.9	1.1	1.4	1.6	1.8	2.3	2.7	3.2	3.6	4.6	5.5	6.4	7.4	8.3	9.2
26	.9	1.2	1.5	1.6	1.9	2.4	2.9	3.3	3.8	4.8	5.8	6.7	7.7	8.6	9.6
27	1.	1.5	1.5	1.7	2.	2.5	3.	3.6	4.	5.	6.	7.	8.	9.	10.
28	1.0	1.0	1.5	1.8	2.1	2.5	3.1	3.6	4.1	5.1	6.2	7.3	8.3	9.3	10.3
29	1.0	1.3	1.6	1.8	2.1	2.6	3.2	3.7	4.3	5.3	6.4	7.5	8.5	9.6	10.7
30	1.1	1.3	1.8	1.9	2.2	2.7	3.4	3.8	4.4	5.5	6.6	7.7	8.8	10.	11.1
31	1.1	1.4	1.7	2.	2.3	2.8	3.4	4.	4.6	5.7	6.8	8.	9.2	10.3	11.5
32	1.1	1.4	1.7	2.	2.4	2.9	3.5	4.1	4.7	5.9	7.1	8.3	9.5	10.6	11.8
33	1.2	1.5	1.8	2.1	2.4	3.	3.6	4.2	4.9	6.1	7.3	8.5	9.8	11.	12.2
34	1.2	1.5	1.8	2.2	2.5	3.1	3.7	4.4	5.	6.3	7.5	8.8	10.1	11.4	12.6
35	1.3	1.6	1.9	2.2	2.6	3.2	3.9	4.5	5.1	6.5	7.8	9.	10.4	11.7	13.

NUMBER OF CUBIC YDS. IN FOUNDATION TRENCHES, &c.—*contd.*

Results in Cubic Yards and Decimals.

Length Trench in feet.	WIDTH OF TRENCH.														
	inches.				feet.										
	12	15	18	21	2	2½	3	3½	4	5	6	7	8	9	10
36	1.3	1.6	2.0	2.3	2.6	3.3	4.	4.6	5.3	6.6	8.	9.3	10.6	12.	13.3
37	1.3	1.7	2.	2.4	2.7	3.4	4.1	4.8	5.5	6.8	8.2	9.6	10.9	12.3	13.7
38	1.4	1.7	2.1	2.4	2.8	3.5	4.2	4.9	5.6	7.	8.4	9.8	11.2	12.6	14.
39	1.4	1.8	2.1	2.5	2.8	3.6	4.3	5.	5.8	7.2	8.6	10.	11.5	13.	14.4
40	1.4	1.8	2.2	2.5	2.9	3.7	4.4	5.1	5.9	7.4	8.8	10.3	11.8	13.3	14.8
41	1.5	1.9	2.2	2.6	3.	3.8	4.5	5.3	6.1	7.6	9.	10.6	12.1	13.6	15.2
42	1.5	1.9	2.3	2.7	3.1	3.9	4.6	5.4	6.2	7.7	9.3	10.8	12.4	14.	15.5
43	1.6	1.9	2.3	2.7	3.1	3.9	4.7	5.5	6.3	7.9	9.5	11.1	12.7	14.3	15.9
44	1.6	2.	2.4	2.8	3.2	4.	4.8	5.6	6.5	8.1	9.7	11.3	13.	14.6	16.2
45	1.6	2.1	2.5	2.9	3.3	4.1	4.9	5.8	6.7	8.3	9.9	11.6	13.3	15.	16.6
46	1.7	2.1	2.6	2.9	3.4	4.2	5.1	5.9	6.8	8.5	10.2	11.9	13.6	15.3	17.
47	1.7	2.1	2.6	3.0	3.4	4.3	5.2	6.0	7.0	8.7	10.4	12.1	13.9	15.6	17.4
48	1.8	2.2	2.7	3.1	3.5	4.5	5.3	6.2	7.1	8.9	10.6	12.4	14.2	16.	17.8
49	1.8	2.2	2.7	3.1	3.5	4.5	5.4	6.3	7.3	9.1	10.8	12.7	14.5	16.3	18.1
50	1.8	2.3	2.7	3.2	3.6	4.6	5.5	6.4	7.4	9.2	11.1	12.9	14.8	16.6	18.4
51	1.9	2.3	2.8	3.2	3.7	4.7	5.6	6.5	7.6	9.3	11.3	13.1	15.1	17.	18.8
52	1.9	2.4	2.8	3.3	3.8	4.8	5.7	6.7	7.7	9.6	11.5	13.4	15.4	17.3	19.2
53	1.9	2.4	2.9	3.4	3.9	4.9	5.9	6.8	7.9	9.8	11.7	13.7	15.7	17.6	19.6
54	2.	2.5	3.	3.5	4.	5.	6.	7.	8.	10.	12.	14.	16.	18.	20.
55	2.	2.5	3.	3.5	4.1	5.1	6.1	7.1	8.2	10.2	12.2	14.3	16.3	18.3	20.4
56	2.	2.6	3.1	3.6	4.1	5.2	6.2	7.2	8.3	10.4	12.4	14.5	16.6	18.6	20.7
57	2.1	2.6	3.2	3.7	4.2	5.3	6.3	7.4	8.5	10.6	12.6	14.8	16.9	19.	21.1
58	2.1	2.7	3.2	3.7	4.3	5.4	6.5	7.5	8.6	10.7	12.8	15.	17.1	19.3	21.5
59	2.2	2.7	3.2	3.8	4.3	5.5	6.5	7.6	8.8	10.9	13.	15.3	17.4	19.6	21.9
60	2.2	2.7	3.3	3.8	4.4	5.5	6.6	7.7	8.9	11.1	13.3	15.5	17.7	20.	22.2
61	2.3	2.8	3.3	3.9	4.5	5.6	6.7	7.9	9.1	11.3	13.5	15.8	18.	20.3	22.6
62	2.3	2.8	3.4	4.	4.6	5.7	6.9	8.	9.2	11.5	13.7	16.	18.3	20.6	22.9
63	2.3	2.9	3.5	4.	4.6	5.8	7.	8.1	9.3	11.6	13.9	16.3	18.6	21.	23.3
64	2.4	2.9	3.5	4.1	4.7	5.9	7.1	8.2	9.5	11.8	14.2	16.5	18.9	21.3	23.6
65	2.4	3.	3.6	4.2	4.8	6.	7.2	8.4	9.6	12.	14.4	16.8	19.2	21.6	24.
70	2.6	3.2	3.8	4.4	5.2	6.5	7.8	9.	10.2	13.1	15.6	18.	20.8	23.4	26.
80	2.8	3.6	4.4	5.	5.8	7.4	8.8	10.2	11.8	14.8	17.6	20.6	23.6	26.6	29.6
90	3.2	4.2	5.0	5.8	6.6	8.2	9.8	11.6	13.4	16.6	19.8	23.2	26.6	30.	33.2
100	3.6	4.6	5.4	6.4	7.2	9.2	11.	12.8	14.8	18.4	22.2	25.8	29.6	33.2	36.8
200	7.2	9.2	10.8	12.8	14.4	18.4	22.	25.6	29.6	36.8	44.4	51.6	59.2	66.4	73.6

EXCAVATION TIMBERING.

Timbering to open drains, 8ft. deep x 2ft. 6in. wide, repeated use of timber Add 10d. to 1/3 per cubic yard on excavation.

Close walling and staying trenches, rough planking and labour, both sides, 2ft. 6in. x 5ft. deep, 10d. per foot run ; 2ft. 0in. x 8ft. deep, 1/3 per foot run. Over 2ft. 6in., up to 4ft. wide, add quarter more for strutting.

Galvanised corrugated iron sheets, with cross rails, preferred in some instances. If timbering is used in made ground, reckon for pointing boards, driving and staying, from 2/– to 2/6 per yard super. For centering.—*See* **Carpenter** for timbering, and below for patent, corrugated, sheeting.

WEMLINGER PATENT AND CORRUGATED STEEL SHEET PILING.

Made from plates, 1/16in. to 5/16in. thick, from 12 feet to 15 feet long. Price, from 1/6 per super. foot.

Saving of cartage, labour, driving and pulling after work finished.

Compared with timber sheeting.

Useful in earthenworks when contending with water or silt.

Withdrawn by hooks and blocks and tackle. (*See illustration.*)

THE GOUBERT STEAM PILE-DRIVING HAMMER.

For driving sheet piling up to 18 feet long, excavation, timbering, or sinking round piles, 9ins. to 20ins. diameter, up to 60ft. long.

The weight of hammer is always resting on top of pile during the blows delivered, from 150 to 200 per minute, as desired.

	Shipping Weight. lbs.	Ram Weight. lbs.	Size. ins.	Energy of blown steam. 100 lbs.	80 lbs.
No. 1 ...	950	200	43 x 16 x 10	.970	.776
2 ...	3400	800	62 x 24 x 14	3.220	2.570
3 ...	5000	1500	76 x 29 x 17	7.600	6.080

Price delivered on rail up to £300. *See* Agent's advt., p. 9 & 14.

SINKING TANKS, WELLS, OR SHAFTS.

Per cubic yard, including tools, tackle, and powder.

Wages of Well-digger, 1/1½ per hour.

	s. d.		s. d.
Excavation for wells or small tanks or shafts, not more than 20 feet deep, light ground			2 6
Ditto in stiff clay or hard gravel			3 6
Ditto in sandstone, hard rock, or shale	9 0	to	13 6
Ditto in bluestone or other trap-rock	18 0	to	27 0

From 20 to 40 feet deep, add one-third.
From 40 to 70 feet deep, add two-thirds.
From 70 to 100 feet deep, reckon double.

Guttering in coal shale or soft shale, per super. ft.	0 5	to	0 6
Guttering in sandstone, per super. foot	1 3	to	1 6
Ditto in bluestone or granite, do.	2 6	to	3 6

N.B.—In the third and fourth items, take the least price for the largest, and the greatest for the smallest wells, on account of the difficulty of working and blasting rock in confined areas.

If blasted with explosives, one side of the tank or well must be kept above the other, to give a face and render the blasts effective. *See* Quarrying.

Guttering.—In rock excavation, where any portion of sides are required to be left even or picked, a groove or gutter must be kept in advance of the main excavation to prevent injury to sides by blasting.

Gutterers, or Rock-choppers' wages, 12s. per day of 6 hours.

See Plant for Guttering Machines.

MINING.

SEWER TUNNELLING AND SHAFT SINKING.

Per lineal foot (all found).

Drive 4 x 3 for sewer, Sydney sandstone ...	12/–	to	16/–
Drive 7 x 7 in Sydney sandstone	20/–	to	27/–
Drive 6 x 3 in hard, compact rock (trachyte) ...	25/–	to	30/–
Ditto in clay or soft shale	10/–	to	15/–

RAILWAY TUNNELS.

Railway Tunnel.—If the rock is self-supporting, after reckoning the cost of guttering both sides and top, the *core* may be removed at about double the cost of similar rock in open cutting, but when timbering is required for subsequent lining, the cost is uncertain.

Per cubic yard.	Without guttering.	With guttering.
Tunnel, 20 x 15, sectional area 30 super. yards, curved all round through hard bluestone rock	15/–	24/–
Ditto, ditto, through granite, &c.	21/–	36/–
Ditto, through soft clay, slate, or shale ...	10/6	18/9

Confined space quarrying, no explosives used :—Sinking circular tank in sandstone rock—10 feet 6in. diam. x 13 feet deep = 42½ cubic yards ; including scappling, sides and bottom :—One man, 500 hours at 1/– = £25 ; about 11/9 per cubic yard.

Reckon extra for existing wages.

MINING IN FELSITE (BURRAGORANG).

Including Haulage and Explosives. 1914	Cost per foot deep.
Sinking shaft on underlay, 30 degrees incline, "Felsite," with horse-whip and ½-ton trucks, to 300 feet from surface, 9 x 6; good holding ground, "stull" posts only	£1 15 0
Ditto, to 300 feet, vertical shaft, plain	2 0 0
Ditto, to 300 feet, with "stull" posts only	2 5 0
Ditto, to 400 feet, steam haulage, 12 x 8 shaft, close timboring	2 10 0
Sinking shaft, 12 x 8, to 600ft., by hand drilling, "Felsite,"	2 15 0
Ditto, with steam winding gear and rock drill, at 600 feet, 12ft. x 8ft. shaft, good holding ground, "stull" posts only, average about	2 10 0
Driving levels, 7ft. x 7ft. 6in. of same	1 5 0
Driving levels, 6ft. x 6ft., by hand of same	1 7 6

Those items include laying rails and timbering, but not management, or the erection of buildings on the surface. The hand labour for shaft includes erection of engine and boiler.

Prospecting Tunnel in Felsite, fall from face to outlet, 200 feet x 6 feet x 4 feet (trucks and rails found)	10/– to 0 15 0
Driving tunnel, 9 feet x 6 feet, fall from face to outlet, up to 300 feet, full cost	1 5 0

MINING SHAFTS.

Double Shaftsinking.—Shaft 10 feet by 4 feet wide, timbered with 9 x 3 H.W., with two cage and one ladder compartments, each about 3ft. 6in. x 3 ft., with two 9 x 3 centres, the two centres and two ends to be let into grooves cut into the sides or wall plates, mitre fashion, so as not to weaken the timber. An opening of two inches is generally left at every fifth set, so as to get in a stage board for repairs. The centres fit close and ensure good ventilation, oven for a shaft 2000 feet deep, giving an *upcast* and a *downcast* current.

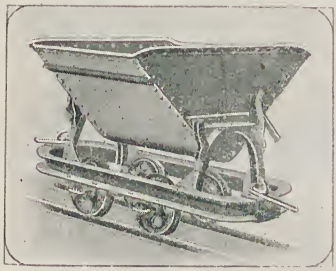
The ladders are inclined with a stage and manhole, not more than 30 feet apart. *See Mines Act.* A shaft as above, with machinery, pumping gear, fuel, &c., will cost about £10 per foot in depth.

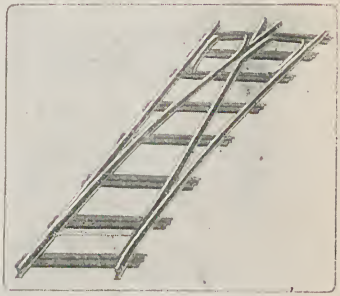
Sinking Shaft, 6 x 3, through trachyte (or the hardest rock at Hill End goldfields), 1870, three men averaged one foot per day for 120 feet deep. This, at 8s. per day, is 24s. per foot in depth, exclusive of cost of windlass, sharps, and explosives.

Tanks.—Unless there is a face or side obtained in sinking tanks or shafts in rocks, the explosive used will have little effect It is therefore usual to keep one side of the tank or hole at least two feet above the other, where practicable. This remark also applies to drives or tunnels. Where tanks or shafts are not lined it is usual to gutter or pick a smooth-faced channel over the whole surface of the sides; but as this process is very expensive, it is not adopted where it can be avoided.

Large open excavations in sandstone cost from 3s. to 5s. per cubic yard.

TRAMWAYS FOR CONTRACTORS AND MINERS.





PERMANENT LIGHT STEEL TRAMWAY.

Standard Sizes of Tee Section Rails Stocked.

Per yard. lbs.	Long. feet.	inches.	Deep. inches.	Section No.
9	12	0	2	4013
12	12	0	2	4013
14	12	0	$2\frac{3}{16}$	4014
14	16	5	$2\frac{9}{16}$	4016
16	12	0	$2\frac{9}{16}$	4016
*20	15	0	$2\frac{9}{16}$	4018
20	18	0	$2\frac{9}{16}$	4018
24	18	0	$2\frac{3}{4}$	4019
28	18	0	$3\frac{1}{8}$	4010

* Suitable for locomotive work.

By adhering to the above standard sections, renewals of the same section and length may always be obtained from stock.

Fishplates, Bolts and Nuts are supplied with the Rails.

Spares can always be supplied from stock.

Approximate price, £9/10/– per ton, delivered f.o.r. or f.o.b. Australian ports from stock. Large quantities can be indented at lower prices.

Dogspikes for fastening the above Rail to Timber Sleepers, £1/1/– per cwt. (approximate) f.o.r. or f.o.b., Sydney.

Permanent Points and Crossings (right and left hand) made from the above Standard Rail Sections are stocked in Sydney.

Approximate prices f.o.r. or f.o.b. Sydney range from £7/10/– to £8/10/– per set.

PORTABLE STEEL TRAMWAYS.

Steel Tee Section Rails, 14lbs. per yard. Standard section used in Australia, $2\frac{9}{16}$in. deep, 16ft. 5in. long.

Equipment includes Fishplates, Bolts and Nuts, steel corrugated Sleepers, and Clips and Bolts for fastening Rails to Sleepers at a gauge of 24in. Axle load carried — 2700lbs.

Approximate prices f.o.r. or f.o.b. Sydney, duty paid, from Sydney stocks.

Track per mile, £325 ; per yard, 3/9.

Curved Sections, 16ft. 5in. long, £2.

Portable Switches (right or left hand), 16ft. 5in. long, £7/10/–.

Steel Turntables to carry 2 tons, £7/10/–.

For further information see advt. page 9–13.

STANDARD STEEL TIP TRUCKS.

Heavy Pattern Steel Double Side Tip Trucks with improved roller bearings, automatic self-locking fastener, and bulb-iron rims are stocked in Sydney, as follows :—

High Standard with Plain Scoop.

Capacity	½	c. yd.,	gauge	24in.	approx. price each...	£10	10	0
,,	¾	,,	,,	24in.	,, ,, ,, ...	11	0	0
,,	1	,,	,,	24in.	,, ,, ,, ...	11	10	0

Low Standard with Ribbed Scoops.

Capacity	½	c. yd.,	gauge	24in.	approx. price each...	£12	10	0
,,	¾	,,	,,	24in.	,, ,, ,, ...	13	0	0
,,	1	,,	,,	24in.	,, ,, ,, ...	13	10	0

Double End Tip Trucks of same construction as above, but arranged for end instead of side tips :—

High Standard with Plain Scoops.

Capacity	½	c. yd.,	gauge	24in.	approx. price f.o.b. or f.o.r. ea.	£13	10	0
,,	¾	,,	,,	24in.	,, ,, ,, ,,	14	0	0
,,	1	,,	,,	24in.	,, ,, ,, ,,	14	10	0

Screw-brakes bearing on 4 wheels are fitted at £3/10/– extra per truck.

All prices include delivery f.o.r. or f.o.b Sydney.

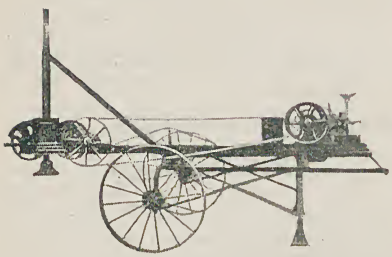
Tramway Specialis's see advt. page 13 & 9.

Tamping, or filling up the holes to prevent the powder blowing out, is an important item in blasting rock. It has been found, after long experience, that dry clay is the best material, and broken bricks, moistened, the second best ; the depth of the tamping should also be at least equal to the depth of the powder, although I have known effective blasts with only one-third tamping. High explosives, like gelignite, strike downwards more than common powder, and does not require so much tamping, but it will be found that dry clay is best in all cases.

POWER TAMPING MACHINE.

For Earthworks.

Weight, complete on Wheels, 8½cwt.



A 1⅜-h.p. Petrol Engine will handle a tamper 100 lbs., area of tamper, 8in. x 9in.

Two men can tamp 130 sq. yards of surface per hour with machine, or as much as 8 men can do with hand tamper = 1⅓ pence per yard. complete.

Price, with Tamper to reach 6ft. below surface, £125.

For Road Excavators and Road Graders, see Section ROADS.

DREDGING.

Excavating by Ladder Dredge.

HARBOURS AND RIVERS.

Government Works Department Report.

	Per ton.
300 days run of 8 hours, "Newcastle" dredge, sand to 26ft. level, and discharging at sea, 10 miles, cost ...	3.16d.
At Newcastle, per dredge "Glaucus," sand to 26ft. level, 394,440 tons, dredging alone	1½d.
Including discharging at sea	2¼d.

Sand on rough rock bottom, costing from 9d. to 1/– per ton.

SUCTION PUMP DREDGING.

	Per ton.
Suction Pump Dredge at Byron Bay, sand and shingle ...	4.26d.
Suction Pump Dredge "Jupiter," sand, mud and shingle, 128,331 tons sand, clay, shell, mud and stone	4.11d.

Alluvial dredging, Araluen G. D. Co., from two ladder dredge, old river bed :—

20ft. above and 25ft. below water, average 55,000 c. yards, cost £80 ; 18ft. above and 28ft. below water, average 11,000 c. yards, cost £80. ⅓d. to 1¾d. per c. yard.

The cost of dredging and towing out to sea five miles, varies from 3d. to 10d. per ton, according to material excavated.

The Government Dredges may be hired from the Sydney Harbour Trust, with their accompanying punts and tugs, at the following rates, per day of 8 hours :—

For Ladder Dredges	£20 to £30
For Grab Dredges	£5 to £7

GRAB DREDGES.

Priestman Bros.' grab is a very effective excavating machine, like a steam crane, but is also specially designed for passing under low bridges, through narrow canal locks, &c.

Cost of working.—The Sydney Harbour Board has dredged heavy silt at 1¾d. per ton, which used to cost 5d. per ton when raised by the large Steam Ladder Dredger, and another Harbour Board has done for 3d. dredging which used to cost 8d. per ton, and, they state, with more hopper accommodation, their work could be done for 1½d. per ton. A railway contractor who was paying 6d. for excavating bridge foundations, subsequently did the same for less than 2d. with one of the above machines.

HAYWARD'S AUTOMATIC GRAB BUCKETS.

For digging, dreggind and re-handling.

This is a "**grab**" **excavator,** operated by wire ropes at the end of a **jib** or **boom,** travelling cable way or electric hoist, and contains steel movable sections that open and close on the material to be removed.

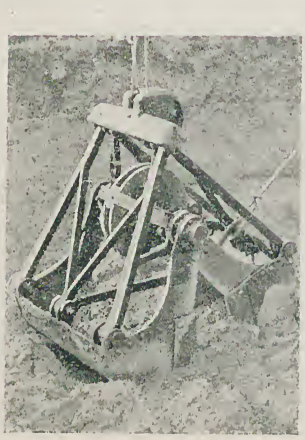
The **Orange Peel** pattern bucket excavator is made in three and four sections, according to capacity of bucket, with the digging points of manganese steel, shaped like a small plow (*see illustration*), which meets with less resistance, like a pointed shovel, compares with the square mouth shovel.

One cubic yard capacity bucket orange peel averaged 400 cubic yards every 10 hours in uncemented gravel and sand.

Being circular, it is suitable for working inside round spaces, sinking **caisons** and **bridge** columns.

Prices Orange Peel pattern Bucket.

2 cubic feet, bowl capacity, in Sydney, £70.
9 cubic feet capacity, £120. 1 cubic yard, £225.



Clam Shell pattern Buckets, single chain, 4 cubic feet, £90; 82 cubic feet capacity, £250.

For further information *see* agent's advt., page 9.

The **Clam Shell** pattern bucket excavator is suitable for transferring sand, crushed stone or gravel from truck or "dump." A one cubic yard bucket is said to transfer 400 to 500 cubic yards in 10 hours.

The **Drag Scraper** pattern bucket, as its name indicates, can be closed at will from the operating machine, and does not have to be dragged *home* every trip.

A one cubic yard drag scraper excavator shifted, on an average, 200 cubic yards of "Hard-pan" in 10 hours, and 600 cubic yards top soil and clay in 10 hours.

For further information *see* agent's advt., page 9.

GRAB DREDGES.

Approximate Quantities of material these machines will discharge per day of 10 working hours—average height of lift 20 feet from ground level—worked by *one man only*—

Size of Crane.	When using the Buckets.		When using the Grabs.	Approx. Price without barge.
	Mud in Dredging.	Small Coal, Sand, &c.	Excavating Clay, &c.	
Z cwts. $2\frac{1}{2}$	100 Tons	Tons.	Tons.	£330
Y „ 5	175 „			
A „ 10	250 „	200 „	150 „	
B „ 20	500 „	400 „	300 „	£600
C „ 30	650 „	550 „	400 „	
D „ 40	800 „	700 „	500 „	£880

The size of the Barge required for carrying the Dredgers depends on the number it has to carry.

For working in canals, narrow rivers, &c., Barges of very small beam can be employed by using loose side timbers, which may be disconnected when necessary.

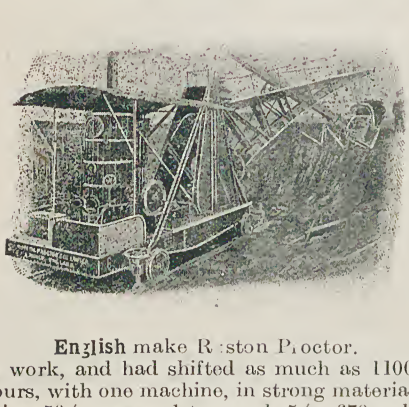
FRACTIONS AND THEIR DECIMAL EQUIVALENTS.

$\frac{1}{64}$	0.0156	$\frac{17}{64}$	0.2656	$\frac{33}{64}$	0.5156	$\frac{49}{64}$	0.7656
$\frac{1}{32}$	0.03125	$\frac{9}{32}$	0.28125	$\frac{17}{32}$	0.53125	$\frac{25}{32}$	0.78125
$\frac{3}{64}$	0.0468	$\frac{19}{64}$	0.2968	$\frac{35}{64}$	0.5468	$\frac{51}{64}$	0.7968
$\frac{1}{16}$	0.0625	$\frac{5}{16}$	0.3125	$\frac{9}{16}$	0.5625	$\frac{13}{16}$	0.8125
$\frac{5}{64}$	0.0781	$\frac{21}{64}$	0.3281	$\frac{37}{64}$	0.5781	$\frac{53}{64}$	0.8281
$\frac{3}{32}$	0.09375	$\frac{11}{32}$	0.34375	$\frac{19}{32}$	0.59375	$\frac{27}{32}$	0.84375
$\frac{7}{64}$	0.1093	$\frac{23}{64}$	0.3593	$\frac{39}{64}$	0.6093	$\frac{55}{64}$	0.8593
$\frac{1}{8}$	0.125	$\frac{3}{8}$	0.375	$\frac{5}{8}$	0.625	$\frac{7}{8}$	0.875
$\frac{9}{64}$	0.1406	$\frac{25}{64}$	0.3906	$\frac{41}{64}$	0.6406	$\frac{57}{64}$	0.8906
$\frac{5}{32}$	0.15625	$\frac{13}{32}$	0.40625	$\frac{21}{32}$	0.65625	$\frac{29}{32}$	0.90625
$\frac{11}{64}$	0.1718	$\frac{27}{64}$	0.4218	$\frac{43}{64}$	0.6718	$\frac{59}{64}$	0.9218
$\frac{3}{16}$	0.1875	$\frac{7}{16}$	0.4375	$\frac{11}{16}$	0.6875	$\frac{15}{16}$	0.9375
$\frac{13}{64}$	0.2031	$\frac{29}{64}$	0.4531	$\frac{45}{64}$	0.7031	$\frac{61}{64}$	0.9531
$\frac{7}{32}$	0.21875	$\frac{15}{32}$	0.46875	$\frac{23}{32}$	0.71875	$\frac{31}{32}$	0.96875
$\frac{15}{64}$	0.2343	$\frac{31}{64}$	0.4843	$\frac{47}{64}$	0.7343	$\frac{63}{64}$	0.9843
$\frac{1}{4}$	0.25	$\frac{1}{2}$	0.5	$\frac{3}{4}$	0.75	1	1.0

STEAM SHOVEL OR "NAVVY."

(*Extracts from* "*Engineering*," 1912.)

In a railway cutting, Grenock, Scotland, marl and rock, 20ft. high by 35ft. wide, assisted by blasting, from 300 to 400 cubic yards was removed per 10 hours, at a cost of 4d. per cubic yard (not including blasting). Previously it cost the contractor 3s. 6d. per cubic yard.



Another comparison.—At Newcastle-on-Tyne, 1904, P. T. Messent, Railway Contractor, working in heavy clayey soil, states the cost of putting clay on wagons was 3d. per cubic yard, against 5½d. by hand previously.

C. J. Wills, Contractor, Manchester Ship Canal, states he had 16 machines at work, and had shifted as much as 1100 cubic yards per day of 10 hours, with one machine, in strong material, the cost of working navvy being 56/– wages, ¼-ton coal, 5/–, 670 gals. water, 2/–; total £3/3/– per day.

English make Ruston Proctor.

Australian present prices for above would be about double = £6/6/– or 1512 pence for 1000 cubic yards, about 1½d. per yard. Add for wear and tear, rail-trucking, 30 per cent.

With the help of a little explosive the navvy shifted the soft English red sandstone very readily, averaging 800 cubic yards per 10 hours.

A steam shovel has been installed for alluvial gold dredging at Araluen, N.S.W.

It is also a useful machine for clay and shale pits excavating and loading.

Prices of Steam "Navvys" range from £950 to £1500, delivered to Australian ports, including freight, duty, &c.

No.	Tons.	Total Weight. Tons.	Size of Bucket.	Output per Day—Tons.
10	12	36¼	1¾ or 2¼	1400
8	10	28½	1 c. yd.	900
6	8	26½	¾	700

See Plant for other Excauators.

QUARRYING.

In quarrying it is always considered advisable to obtain a vertical face to the quarry, the higher the better ; if the stone is detached at the ends with a natural cleavage, parallel with the face of the quarry, you will then be able to obtain an immense quantity of stone with a single hole. A block of freestone was detached from the face of a quarry at Sydney, about 150 feet long by 35 feet wide and 46 feet deep. A 5-inch hole was bored in the line of cleavage, about 75 feet from each end of the quarry, and 35 feet from its face, to the bed of the quarry, 46 feet in depth, into which was inserted 200lbs. of blasting powder, filling up the lower 26 feet of the hole, the upper 20 feet tamped with dry clay. The mass, weighing about 15,000 tons, was moved forward about 18 inches, ready to be wedged and split up into blocks suitable for building. This hole was fired in three places by electricity, removing 75 tons of freestone for every lb. of powder exploded. By Sir F. Burgoyne's formalae for limestone, this would have required

$35^3 = \frac{42{,}875}{32} = 1340\text{lbs.}$ { the quantity actually used was nearer } $35\frac{1}{2} = \frac{1225}{6} = 204\text{lbs.}$

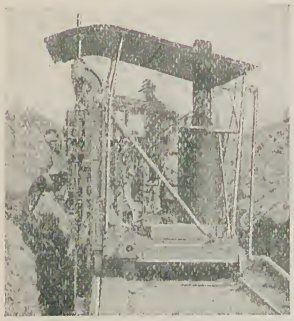
In opening a quarry there is always a loss of labour in removing surface soil from the top, or at the foot of the quarry, down to the natural bed, sometimes both ; also in getting a vertical face and open ends for a really effective or great blast, so that an ordinary quarry does not pay for the first two or three months.

MEASUREMENT.

Although the stones are always quarried larger than the net size required, the latter only is paid for. If the stones are bevelled or angular, the largest dimensions square with each other are reckoned.

Soldier stones are building stones laid on the edge in contradistinction to stones laid on their natural bed as generally specified and carried out, but there are many exceptions to this rule because it has been found by actual experiment that some stones (as at Glasgow, where it is usual to set all building stones on their edge except cornices) are actually stronger on their edge than on their natural bed. The Sydney sandstone possesses similar properties, as proved by Professor Warren. The bank at the corner of George and Hunter-streets, the pilasters, 18¼ feet in height by about 2 feet square ; also the stones forming the pilasters opposite the granite columns of the Sydney Post Office, about 12 feet high, are Soldier stones.

QUARRYING BY CHANNELING MACHINES.



Also in the Oolitic limestone quarry, at Bloomington, Ind., and the Columbian marble quarry, the rigid head and swivel head channelers for vertical and inclined cutting, excavate gutters 6½ inches wide to a depth of 14 and 15 feet, less width for less depth.

The wheel pits at Niagara Falls, 185 feet x 21 wide, 480 feet long, and great Canal of Lake Superior Power Co., outlining sides with smooth faces. Compressed air was the motive power to operate the channelers, the centre material was removed by explosives.

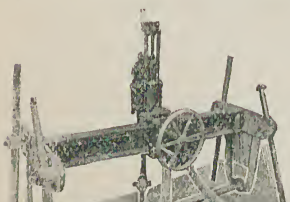
The Swivel-Head machine is more favoured in marble quarries, on account of its light weight, great cutting capacity and wide range of adjustability to follow the grain, and get best results in design from the coloured marbles, cutting straight faces to 10 feet if desired, and working up to 30 degrees inclines on cogged rails.

Marble cutting, 15 to 20 feet x 3in. wide, per minute — 3 to 5 super feet guttering per minute.

Soft Sandstone and Limestone cutting, 20 to 30 feet x 3in. wide — 5 to 7ft. 6in., super feet per minute.

Where extensive blocks of Sandstone occur without beds, an under cutter or steam pick is used to cut horizontally.

A channeler to cut 120 linear feet 20ft. x 6ft. deep x 5ft. wide in typical Sydney Sandstone in an 8 hours' shift, will cost from £450 upwards, f.o.s.w. Australian ports. Under-cutter, £300.



Track Channelers, swivel-head, are now in operation by M.W. and S. Board, Sydney, and W. Solomon & Sons, contractors, Sydney.

In Sydney Sandstone foundations channels have been cut out by the aid of steam or compressed air rock drilling, travelling on runner (*see* illustration), with special chisel and feed screws, at half the cost of hand guttering. Foundations throughout city outlined. Agent, Guthridge & Co. Price, from £98 to £120 in cities. *See* advt. page 44.

ROCK DRILLS.

Rock Drills are used in all the Australian States for mines, quarries railway excavations, etc.

The Holman Rock Drills are made in sizes from 2in. to 3⅝in. for standard work. The Holman Drill won the 1st prize in the Rock Drill contest conducted by the Transvaal Government in the Rand mines.

Drills, 2½in. diam. cylinder to 3⅝in. cylinder, £36 to £48.

Columns, single screw, 3in. diam., £6/10/–; 4½in. diam., £8.

Double screw, 4in. diam., £9/8/–; 4½in. diam., £9/10/–.

Rock Drill Clamps, 3in. diam., £3/5/–; 4½in. diam., £3/10/–.

Tripods, complete, with weights and clamp—Small, for 2½in. and under drill, £10; Large, for over 2½in. drill, £14. *See agent's advt. page* 13.

Drilling only limestone.—Total length of holes in 8 hours, 35 to 45 feet—average, 39 feet.

Two drills sank shaft below 900 feet, 5ft. per 48 hours—17ft. x 8ft. Machine men working only 12 hours in 48 hours; equal time being required to remove the waste and put in 5 feet set of timber; 5 shovelmen working one shift removing waste.

Average progress of drill boring with 1⅛in. bore, from 4 feet to 5 feet per hour, through quartz and trachyte, using 80lbs. pressure compressed air.

The plant, with 4 rock drills and appliances, costs about £350.

SULLIVAN HAND HAMMER DRILLS.

Price, "DB-15," £15; "DB-19," £20/10/–. Telescopic feed for stopping, price, £26.

Sullivan Hand Feed Hammer Drills are made in several sizes, of which the most popular are the "DB-15" and "DB-19," weighing

25 and 41 pounds respectively. The "DB-15" is capable of drilling holes up to five feet in depth, 1in. diam., while the "DB-19" tool will drill six foot holes, 1½in. diam

These drills are directed by hand, and work with very little vibration. The holes are kept free of dust and mud by a blast of air, led from the exhaust ports to the face of the bit through the hollow drill steel.

One New England contractor used a Sullivan outfit in cutting trenches for water pipes. The rock consisted of granite ledges and boulders. The average footage, with one large and one small hammer drill, was about 160 feet of hole in nine hours. The compressor used about 15 gallons of gasoline per day. The estimated saving was from 65 to 75 per cent. in removing rock in trench work with this outfit, as compared with hand drilling.

When the first steel has cut to its depth remove it—never allow your clearance to become too worn; the following steel, when inserted, should fit the bottom of the hole so as not to jamb.

When a cavity or cross fissure is met with, crank the machine down to a short stroke until the bit or steel has started in the next ledge.

In drilling back holes through damp ground do not run the feed screw the full length. In working the drill back give a good supply of air to prevent the cuttings from packing around the shaft of bit; then knock back quickly till cleared.

In soft ground, where the debris soon clogs the bit, feed slowly and lightly, and quickly tap with drill, using half head of air and a very long stroke to work debris and water into batter.

Experience has shown that the best quality of hose is most suitable, lasting, and least expensive. For steam hose, marline wound, being cooler to handle than metal winding. Half round wire is recommended for air hose, as the flat surface will not cut the rubber, and prevents kinking.

Flexible metallic tubing is specially made for heavy wear.

See prices of above. *See* India-rubber.

SUBMARINE.

Owing to variable conditions, no fixed prices can be quoted. Boring holes for sandstone to receive foot of piles, vary from 20/– to 60/– each.

In bridge foundations, preparatory work in clearing silt away is usually done by grab dredges. *See* DREDGING.

Scott & Goodsir's Patent Submarine Rock Excavator and Rock-drill, with and without the aid of divers, has done valuable work in Sydney Harbour sandstone, 20 to 30 feet below water. In appearance, it is not unlike a steam pile-driving structure, built on end of punt, with a long cutting chisel working in frame-work, 60 feet high. The operators on platform 37 feet up, as well as on deck, where boiler and machinery are situated. For particulars apply Wildridge & Sinclair, engineers, 82 Pitt-street.

Spikes may be successfully driven under water 12 to 20 feet deep, by placing straight pipe or tube in position. Drop spike down inside tube and drive home with iron or steel rod inside tube.

Drilling for explosives under water, with hand jumper from surface enclosed in pipe driven into debris to surface of rock for guidance of work and charging can be successfully accomplished.

Snagging rivers by blasting with dynamite, as practised in the Waikato River, New Zealand. The inspection was made by an hydraulic telescope (a gal. iron tube, with glass fixed at end.) The holes were bored with 1½in. steel auger.

Ingersol Rock Drill, mounted on tripod column or bar, as desired.

Cylinder.	Weight, lbs.	Length.	Stroke.	Feed.	Price.
3½in.	265	41½	6½ to 8	24	£70
3in.	180	37½	6½	23	£65
2¼in.	145	34	—	18	£60

From 20 to 80lbs. pressure of air required to work above drill. Will move at 5lbs. Cost in coal per drill, 3in., in 24 hours—4 cwt.

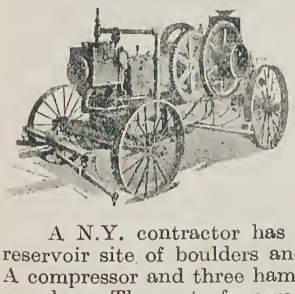
See advt pages 9 and 14, and outside cover.

AIR COMPRESSORS.

A **compressor** of 667 cubic feet capacity provides sufficient air to drive 7 of 3½in. drills; 11 of 3in.; 16 of 2½in. short rock drills. An air compressor should have 4 per cent. extra capacity for every 1000ft. above sea level.

The **Bury Compressors** are of the latest American design, made in all types; driven by **belt, steam,** or **electric motor.** Pat. cushion poppet inlet and discharge valve, and pat. automatic, pneumatic force-feed oiling system, are features in design. 7 or 8 drills can be driven at an average of 5 tons of wood fuel per week per drill. Machines stocked, and all particulars forwarded in detail by the Australian Metal Co., Ltd. *See* advt. page 13.

Sullivan "WK-3" Portable Air Compressors.—The Sullivan Portable Compressor consists of a single stage compressor, driven by a gasoline engine, both being mounted on a steel wagon truck. The 15-horse power outfit will keep one "DB-15" and one "DB-19" Sullivan hammer drill supplied with air at 90lbs. pressure, while the 20-horse power rig will supply air at 100lbs. for two of the larger drills, "DB-19."



The compressor is of the Sullivan horizontal, center crank pattern, with a single cylinder, 8 x 10in. in size.

Price 15 h.p.	..	£450
,, 20 h.p.	..	500

A N.Y. contractor has used one of these outfits for clearing a reservoir site of boulders and breaking them up for use in concrete. A compressor and three hammer drills drilled on an average of 150ft. per day. The cost of operation was estimated as follows:—

	£	s.	d.
3 drill operators at 11/- per day	1	13	0
Compressor attendant engineer	0	12	0
Gasoline per day, 15 gallons at 2/-	1	10	0
Add interest, renewals, wear and tear, 10 p.c. ..	0	7	6
Total cost per day for 150ft. drilled.. ..	4	2	6

Or about 6⅝d. per lin. foot.

Other uses for which they are valuable include riveting on structural steel work, such as bridges, putting ornamental finish on concrete surfaces, such as viaducts, buildings, &c. (with bushing tools), tearing up street pavements, removing old building foundations, and excavating in rock for new ones, &c.

One drill will do 32ft. per day with three men and a boy. Patent blowers are sometimes used for ventilation at about 5lbs. per square inch. For the sake of comparison I may here state that with 1¼in. hand drill two men will do only 8ft. per day through quartz or trachyte.

EXPLOSIVES.

BLASTING AND EXPLOSIVES.

Prices liable to fluctuation.

For sandstone quarrying, where the mass of rock is not to be shattered, the slower explosive action of blasting powder is preferable.

In large blasts, chambering for the concentrated charge of the powder is made by simply exploding a cartridge or two of gelignite at bottom of drill hole, and clearing out debris previous to charging. *See* under " Quarrying " for blasting powder required.

BLASTING POWDER, loose, 6½d. per lb.

COMPRESSED BLASTING POWDER.—This is now much used in sewer work, and is compressed by powerful hydraulic presses into Pellets, 1in., 1⅛in., 1¼in., and 1⅜in. diam., by about 2½in. long, with a hole through the centre for the fuse. The advantages are said to be :—

1. A greater amount of powder in a smaller space, and consequently a smaller bore hole is required.
2. Where rock drills are used, and a great number of holes have to be charged, sometimes among fumes, it is much quicker done.
3. They are cleaner for charging, as no loose powder remains in crevices, causing waste and danger in tamping. **Price,** 7⅝d. per lb.

PERMITTED EXPLOSIVES, for use in Coal and fiery mines :—

Bobbonite Pellets, no detonator required. **Price,** 7d. per lb.
Brillonite, Carbonite, Fracturite, Saxonite, for hard headings.
Monoble and Colliery Cheddite are high explosives.
Curtis & Harvey's Dragonite, for ironstone, granite and slate quarries.

CHEDDITE is a patent explosive, by Curtis & Harvey, awarded 6 medals and Liege (Gold Medal), 1905. It contains no nitro-glycerine or hygroscopic substances, is unaffected by exposure or temperature. Similar to gunpowder in spreading action, with more energy. Delivers the rock in sound condition for structural work. Conveyed under the same regulation of package as gunpowder ; will not explode by spark or ordinary flame. Supplied in cartridges or loosely like gunpowder. **Price,** 9d. per lb. ; 36/6 per 50lbs.

SOME TEST RESULTS FIRED RECENTLY are as follows :—

LIMESTONE quarry at Abbotsleigh.—A hole 4¼ feet deep with 3lbs. 5½ozs. of Cheddite. Block removed measured 26 feet, 9½ feet transversely and 5 feet deep — to 91½ tons ; or 27 tons of rock obtained per pound of explosive.

At the stratified FLINT quarries, Wick, near Bristol, the rock is nearly pure Silica, and extremely hard, a 1½in. cube resisted breaking up to a crushing force of 20.35 tons. A shot was fired here on July 9th, 1902, in a hole 2ft. deep, on a bed 2½ft. thick, with 5¼ozs. of Cheddite, which broke out 27 sq. ft. of the bed, yielding over 6 tons—or 18 tons of flint per pound. Agents—Scott, Henderson & Co., *see advt.*

HIGH EXPLOSIVES.

Gelatine explosives, by reason of their plasticity and greater power and water-resisting qualities, are more suitable and economical than Dynamite, and can be recommended for all ordinary rock-blasting purposes, pit-sinking, tunnelling, quarrying, metalliferous mining, limestone blasting, submarine blasting, etc., and are unaffected by water.

No. 1 DYNAMITE is a reddish-brown moist powder, 75 p.c. Nitro-Glycerine, absorbed in 25 p.c. of Kieselguhr. As Dynamite parts with its Nitro-Glycerine if left for a time in contact with water, it should be kept perfectly dry until used. 58 cartridges to 5lb. packet. **Price,** 10d. per lb., or 43/– per 50lb. case.

BLASTING GELATINE is yellowish in colour, semi-transparent, and elastic to the touch. It is composed of 93 p.c. of Nitro-Glycerine and 7 p.c. of Soluble Gun-cotton, and is 50 p.c. stronger than No. 1 Dynamite. It is specially suited for submarine blasting, tunnelling and sinking, and where hard rock is to be removed. 52 cartridges to 5lb. packet. **Price,** 1/2 per lb., or £2/14/6 per 50lb. case.

GELATINE DYNAMITE is an opaque plastic compound consisting of 80 p.c. Nitro Glycerine and Nitro-cotton, and 20 p.c. Nitrate of Potash and Wood Meal. It is 30 p.c. stronger and has a less shattering effect than No. 1 Dynamite, being specially suitable where the rock is required to be removed in as large masses as possible. **Price,** 1/– per lb.

GELIGNITE is an Oralate of Ammonia Compound, or a variety of Gelatine Dynamite, being 12 p.c. stronger than No. 1 Dynamite. It is suitable for all kinds of mining and engineering operations where a milder explosive than B.G. or G.D. can be used. **Price,** 10d. per lb. or £2 per 50lb. case.

RACKAROCK PATENT BLASTING COMPOUND is composed of two ingredients, the *cartridges* and *the liquid,* which are not explosive while separate. When required for use dip the cartridges in the liquid for a *few seconds* and then treat them as Dynamite. It may be stored or forwarded by land or water the same as ordinary goods and at the same rates. It does not cause headache even when used in close workings.

RACKAROCK is 1/7½ per lb., 50lbs. and upwards. The proportion of solid to liquid is 4 to 1, viz., 40lbs. cartridges and 10lbs. liquid. No. 6 detonators only should be used. It is slower in its action than Dynamite, and more like common blasting powder in this respect. Made in seven sizes, from ¾in. to 2½in. diameter. **Price,** 8d. per lb. R. A. Hervey, Clarence-street, Sydney; N. Guthridge, Melbourne, are the agents.

ROBURITE.—Roburite is four times as powerful as Hall's blasting powder, and is equal to the best dynamite. Experiments were made at the Burwood Extended Colliery Co., N.S. Wales, with Roburite, which were highly satisfactory. The company have a factory at Eastwood, near Sydney.

ELECTRIC SHOT FIRING

is now recognised as a much cheaper and safer method of shot firing as compared with ordinary safety fuse, and better results are obtained in removing rock from extensive face when a number of shots are fired simultaneously.

Firing by electricity.—In firing holes, a complete circuit must be made with the insulated wire, and wherever the wires are joined, the surfaces must be scraped clean with a pocket-knife. The battery must be connected by the man that charges the holes, after he has been wound up the shaft, and if any holes misfire, the battery must be disconnected by him before descending the shaft.

For the guidance of intending users of electrical blasting, the following is a specification of the necessary appliances :—

An Exploder (Battery).

100 yds. Main Cable, double wire, 3/9 per lb.

100 yds. I.R. Covered Wire, to be used in short lengths from shot-hole to shot-hole, as connecting wire. 2/9 per lb.

Detonators, No. 6, £1/13/6 ; No. 7, £2/4/6 per m.

Electric No. 6 Detonator Fuses, low tension, fitted with connecting wires, 4ft. long, 10/– per 100ft. ; 4ft. 6in. long, 14/6 ; 5ft. long, 15/– ; 6ft. long, 16/6 ; 8ft. long, 18/6 ; 10ft. long, £1/1/–; 12ft. long, £1/5/– per 100.

SPECIALITIES.

A Testing Set or Galvanometer, for testing Low Tension Fuses, before firing, £3 to £5.

One Pound Chatterton's Compound.

Two Coils Rubber Taping.

Gutta Percha Fuse and **Countered Gutta Percha,** for blasting in water or very wet ground.

Colliery Fuse for fiery and dusty mines.

I have fired two 4-inch holes, containing 66 and 34lbs. of blasting powder respectively, 80 yards from charge, removing about 900 tons of Sydney freestone with Exploding Battery C.E.M. I have also fired with certainty of success four Exploders simultaneously, the twin cable to holes being 30 yards only, and the three wires joining the four charges, about 11 yards each, removing 4000 tons sandstone at Pyrmont, Sydney.

Rand's Battery Exploder.—At Sandhurst, 14 holes have been fired at once with this machine.

Various kinds of Exploders are made, small and portable, and about 20lbs. each.

Siemen's Exploder, capacity 10 holes, £4/5/–.

Rackbar ditto, capacity 20 holes, £8.

All directions for charging, arrangement and testing of wires, and firing with above, are printed and accompany machines, and should be followed minutely to detail, to save accident and ensure success.

BLASTING.

Blasting.—One lb. of the best blasting powder will remove from three to six perches of sandstone, or from three to six tons of bluestone, granite, &c., if used in the usual way ; the powder is most effective if the line of resistance (the distance from the hole to the face of the rock) does not exceed one-half the depth of the hole, the ends being open or free.

COST OF DRILLING BY HAND JUMPER.

Blasting Powder required for different sized holes, &c. :—

Diam. of Hole. Inches.	Powder in 1 foot. Lbs.	Depth for 1lb. Powder. Feet decimals.	Cost of Drilling, &c., per foot by Hand Jumper		
			Shale	Sandstone.	Bluestone.
			s. d.	s. d.	s. d.
1½	0.71	1.41	0 6	0 8	1 4
2	1.26	0.80	0 7	0 10	1 8
2½	1.98	0.51	0 8	1 0	2 0
3	2.83	0.35	0 10	1 3	2 6
3½	3.85	0.26	1 0	1 6	3 0
4	5.03	0.20	1 2	1 9	3 6
4½	6.36	0.16	1 4	2 0	4 0
5	7.86	0.13	2 0	3 0	6 0
6	11.31	0.09	3 0	4 6	9 0

The last column includes labor, sharpening jumper, and fuse in charging and tamping per foot for the first 6ft. ; for the next 10ft. add one-half per foot, and from 16 to 26ft. double. For the first 6ft. one man can manage the drill ; from 6 to 16ft., two men, and from 16 to 26ft., three men are required. If only one size of drill is used—say 4in. in diameter, it will wear away to 3½in. before it is down 20ft., even in the soft freestone of the coal measures, as at Sydney and suburbs.

The hardness of sandstone varies even in the same quarry, but the above table is for the average yellow block Pyrmont stone. In surface sewer excavation I have known a 5ft. hole x 1½in. diameter at surface drilled with hand jumper in 30 minutes, with only three sharps. At 30ft. under surface the same sized hole took two hours, with 10 sharps. A careful personal inspection and trial holes on site are necessary for safe tendering.

GLAZIER.

Glass is measured by the superficial foot, and the glazing is generally done by the firm supplying the glass. The following prices include glazing and putty.

Ordinary curved plate glass is charged according to size, from 20 per cent. extra.

	Glazier, per hour.	Putty, per cwt.
		per ft. super.
¼in. Polished Plate—		0s. d.
Up to 12 feet super.	... ...	1 9
12 to 25 ,,	... ...	1 11
25 to 50 ,,	... ...	2 0
50 to 60 ,,	... ...	2 3
60 to 70 ,,	... ...	2 6
Special Prices for larger sizes. *See* advt. page 22.		
Polished 3/16in. Plate, additional	... ...	0 3
Ground Plate, additional	... ...	0 6
Sheet Glass—		
16 oz.	... ... from	0 3½
21 oz.	... ... ,,	0 4½
26 oz.	... ... ,,	0 6½
32 oz.	... ... ,,	0 9
Ground Sheet, 16oz., 7½d.; 21oz., 9½d.; 26oz., 11½d.; 32oz.	...	1 1½
Enamelled, 8½d.; 21oz.	... ...	0 11½
Plain Colors, Blue, Ruby and Amber	... ...	0 9½
Green	... ...	0 11½
Figured Rolled (comprising Japanese, Mallocene, Chances', "B" and "G" and large and small Muranese)—		
White	... ...	0 10½
Tinted	... ...	1 0½
Cathedral	... ...	0 8½
Muffled	... ...	1 0½
Rough Rolled and Rough Cast, ⅛in., 7d.; 3/16in., 9d.; ¼in.	...	0 11
Wired Rolled, one width only, viz., 24in.; lengths up to 9 feet		1 6
Cat's Eye Reflecting Glass,		

LARGEST SIZES OF SHEET GLASS MANUFACTURED.

Weight of per sq. foot.	Length.	Width.	Area in sq. ft.
16	48	40	about 13
21	70	50	24
26	70	50	24
32	66	44	20

WEIGHT OF ROUGH GLASS PER SQUARE FOOT.

Thickness, ins.	⅛	3/16	¼	⅜	½	⅝	¾	1
Weight, lbs.	2	2½	3½	5	7	8½	10	12½

3/16in. Corrugated Rough Rolled, 72 x 27, per sheet, 2/3 super. ft.

SILVERED PLATE.

	sup. ft.		sup. ft.
Up to 5 feet super ...	1 10	8 to 10 feet super. ...	2 3
5 to 6 feet super. ...	1 11	10 to 12 feet super. ...	2 4
6 to 7 feet super. ...	2 0	12 to 20 feet super. ...	2 6
7 to 8 feet super. ...	2 1	20 to 40 feet super. ...	2 8

Diamond Rolled, White, 1/3 ; Amber, per ft. super. ... 1 6
Opal, Pot, for Lamps, per ft. super. 0 9
Smoothed for painting on, per ft. super.... ... ... 1 0
Maximum Light Glass, for increasing the light, per ft. super. ... 2 0
Ditto, in copper blazing, per ft. super. 4 6
Ditto, in Leaded Light ... ... 3 6 to 5 0
Cat's Eye Reflector Light Glass.
Stained Enamelled (Amber or Blue ornaments), per ft. super. ... 1 6
Engraved (Blue, Ruby and Amber), per ft. super. 2 6

See advt. page 22.

GLAZING BARS.

Pennycook's Patent Glazing Bars, per ft., lineal, from 1/9 up.
Princeps Glazing Bars, fitted with capping, per lineal ft.—
Straight, 1/5 to 1/9 ; stepped 2 0
Brass attachments, shoe and head, per set 1 5

see advt. page 22 & 26.

BEVELLING.

Wide	¾in.	1in.	1½in.
Up to 10 feet	0 4	0 7	1 0
,, 15 ,, ...	0 5	0 9	1 3
,, 20 ,, ...	0 8	1 0	1 8
,, 25 ,, ...	1 0	1 6	2 0
,, 30 ,, ...	1 6	2 0	2 6

Curved Edges Special Prices.

LABOUR.

Glazing and **Cutting,** per sq. ft. upwards, 1d.
Polishing edges, plate glass, under ⅜in. thick, from 8d. per foot run.
Drilling holes in Plate Glass, up to ¼in. diameter, 6d. each ; ½in., 1 0
Silvering only to Plate Glass, at owner's risk—

Up to 3 feet sup.	0 9
3 to 10	0 6
10 to 20	0 8
20 to 40	1 0

CUTTING GLASS GAUGE TUBES.

The proper way is to take the point of small file and simply scratch the inside of the tube all round at the part you want it cut, and if the piece does not fall off in your hand at once, lay it aside for a little and you will find it as you want it in a very short time.

LEAD LIGHT WORK.

	sup. foot.
Plain sheet, and obscured, in quarries or squares	1 6 to 2 3
General domestic work, tinted cathedral, according to design	2 3 to 8 0
Special work and designs	5 0 to 15 0
Gothic cathedral and church	18 0 to 30 0
Best figure and gothic work, up to	... 40 0
Embossing, not including glass	3 0 to 3 6

Above fixed to stonework or steel frames.

Pointing in grooves in mastic, per foot run, 2d.

CLOISONNE GLASS.

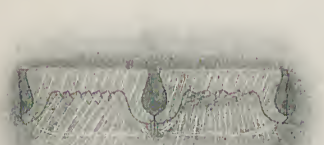
This decorative glass is made by silver and gilt wire designs filled in with different coloured granular glass, fastened with translucent cement and hermetically sealed between double glasses to prevent dust or moisture penetrating. Being very strong, and enforced with wire, it requires no stiffening bars to fix it; burglar proof. Unlike lead light, the design is transmitted from both sides. Can be made in sizes up to 9in. x 4in. Price, 4/– per super ft.

Receipe to Remove Old Glass from Sashes.

Run a hot soldering iron (or other hot metal) along surface of putty to soften same, then scrape with knife or chisel.

PAVEMENT AND ROOF LIGHTS.
KEPPLER'S FERRO GLASS.

These "lights" encase the steel bar supports and the incorporated prisms of the block of glass reflect the rays of light around the bar, so that no dense shadows are cast.



For Pavements.

No. 315, Ordinary Lense or Prismatic Lense, 6in. x 6in., per sq. ft.	16 6
No. 320, very heavy Ordinary Lense, 5in. x 5in., per sq. ft. ...	20 0

For Roofs.

No. 319, Ordinary Lense or Prismatic Lense, 6in. x 6in., per sq. ft.	13 6
No. 316, Ordinary Lense, 8in. x 8in., per sq. ft...	13 0

For Stall Boards.

No. 350, Ordinary Lense, 6in. x 6in., or 8in. x 8in., per sq. ft.	13 6

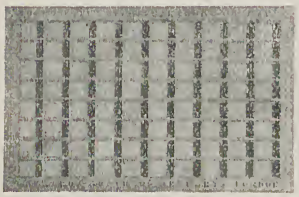
These prices include laying, fixing, and leaving finished.

Otto Waschatz Prop., Ltd., Richmond, Melbourne. John E. Tonks, sole agents, Pitt-street, Sydney. *See* advt. page 51.

HAYWARD'S OR HYATT'S PATENT PRISMETIC LIGHTS.
Colonial Manufacture.

PRISMATIC LIGHTS FOR PAVEMENTS, STALLBOARDS AND ROOFS.
Colonial Manufacture.

	s.	d.
Semi-Prism, 4in. x 3in. Glasses, per sq. foot	8	6
All Prisms, 4in. x 3in. Glasses, per sq. foot	10	0
All Lenses, 4in. x 3in. Glasses, per sq. foot	6	6
Stallboard Lights, 5¾in. Glass, reflecting lenses, per sq. foot	8	0



The lenses and prisms are fitted in the pockets with improved patent mastic putty, thus avoiding lamination through contraction of the iron frames.

The frames are cast locally from the best imported iron.

The glass is the best imported English make, the same as that used by the makers of the highest class pavement lights.

EXAMPLE OF ESTIMATING.
Glazing Bar Skylight Roof, per square.

	£	s.	d.
8 bars, 10ft. = 80ft. at 1/7	6	6	0
16 shoes, at 7d.	0	10	0
16 cuts to bars, at 3d....	0	4	0
	7	0	0
Fixing above framework	3	0	0
Material and labor £10	0	0	

Add price of—	Per sup. ft.		
Wired Glass	0	2	0
Rolled Glass	0	1	6
Profit, 20 per cent.	0	0	9
	0	4	6

Griffiths' Patent Roof Skylights—Frames 24ft. gauge, best iron. Prices do not include glass.

Example—	£	s.	d.
Sizes from 3ft. x 2ft. wide to 6ft. x 10ft. wide, per foot super	0	2	8
3ft. x 2ft. frame = 6 s. ft. at 2/8 ... ... costs	0	16	0
5ft. x 6ft. frame = 30 s. ft. at 2/8 ... ... ,,	4	0	0
5ft. x 4ft. frame = 20 s. ft ... ... ,,	2	13	4

Hinged lights, extra cost 10/-.

INDIA RUBBER.

Corrugated and Pyramid Rubber Matting.

For Shop Doorways, Treads, Bathrooms, Landings.

Sheets, 3ft. wide, $\frac{1}{8}$, $\frac{3}{16}$, $\frac{1}{4}$in. thick. Pyramid, $\frac{1}{8}$in. only.

Weight of rubber varies according to quality quoted, but the general average :—$\frac{1}{8}$in. thick — 1lb. per sq. ft., $\frac{3}{16}$in. thick — 1½lb. per sq. ft., $\frac{1}{4}$in. thick — 2lbs. per sq. ft. **Price,** 2/– per lb.

Sheet Rubber, plain or metallic, $\frac{1}{32}$in. to $\frac{3}{16}$in. thick, 3/9 to 4/– per lb.

Perforated Door-mats, $\frac{3}{8}$in. thick — 2lbs. per sq. ft., or 24in. x 18in. mat — 6lbs., at 2/– per lb. — 12/–.

Lettered and special mats, 2/6 per lb.

Rubber Tiling in ornamental designs and colours, for Corridors, Bathrooms, $\frac{1}{4}$in. thick, per sq. ft., 7/–.

Draught Tubing for air-tight chambers, with canvas flange attachment—$\frac{3}{16}$in., 2/– ; $\frac{1}{4}$in., 2/6 ; $\frac{5}{16}$in., 3/6 ; $\frac{3}{8}$in., 4/6.

INDIA RUBBER HOSE.

Hose measurements always internal diameter.

Internal diameter.	in. $\frac{3}{4}$		in. 1		in. 1¼		in. 1½		in. 2		in. 3	
Canvas delivery hose, per yd.	0	6	0	7	0	10	1	0	1	3	2	0
India Rubber delivery hose, 3 ply, superior, per ft....	1	3	1	8	2	0	2	6	3	9	6	6
India Rubber Suction Hose, 3 ply, per ft.	1	6	1	10	2	3	2	8	3	6	5	4
Spiral Steel Armour for any of above, extra per ft. ...	0	1½	0	2	0	2½	0	3	0	5	0	9

Air and Rock Drill Hose, 4 ply, $\frac{1}{2}$in., 1/8 ; $\frac{5}{8}$in., 1/10 ; $\frac{3}{4}$in., 2/– ; 1in., 2/6.

Diving Hose, sinking or floating, $\frac{5}{8}$in., per ft. run, 3/– ; heavy, 4/–.

Diaphragm Pump Valves—Douglas pump, No. 1, 10/– ; No. 2, 15/–. Edson, Star or Gould pump, No. 2, 12/6 ; No. 3, 15/–.

Gum Knee Boots, for wet sinking, from 25/– per pair.

Rubber Gloves, for electricians' use—short, 10/6 ; gauntlet, 12/6, 15/–.

Tubing for Gas—No. 1 quality, $\frac{3}{16}$in. (inside diameter), 3d. ; $\frac{1}{4}$in., 4d. ; $\frac{3}{8}$in., 6d. ; $\frac{1}{2}$in., 9d. ; $\frac{3}{4}$in., 1/3 ; 1in., 2/3 ; 1¼in., 3/6 per ft.

Vulcanised or mineralised India Rubber weighs from 6 to 9lbs. per super ft., 1in. in thickness ; this diversity in the weight is owing to the quantity of sulphur incorporated, which varies according to the purpose for which it is applied.

Diving Apparatus complete in the Australian cities from £135 to £175.

IRONMONGERY.

Illustrated Lists are published of the items under this head by ironmongers, the prices varying so much according to the design and quality of the article.

Special makes and patent goods are therefore mentioned and the trade price given.

DOOR FURNITURE.

Brass Rim, 6d. ; Milled Edge, 10d. to 1/6 per set.
Brass Mortice Furniture, 1/6 to 4/- per set.
Crank Furniture, 1/3 to 1/6 per set.
Wood Furniture, 2/- to 4/- per set.
Finger Plates, 2/-, 3/6, 5/6, to 10/6.
Cupboard Locks, japanned, 2in. to 4in., 6d. to 1/- each.
Lever, 2in., 9d. ; 4in., 1/3 each.
Hobbs' Japanned Cupboard Locks, from 2/6 to 3/6 each.
Brass Cupboard Locks, Straight, 1in., 9d., 1/- ; 1½in., 1/-, 1/3 ; 2in., 6d., 9d., 1/-, 1/3 ; 2½in., 9d., 1/-, 1/3 to 2/- ; 3in. and 4in., 9d., 1/- to 2/- each.

DOOR ROLLERS AND HANGERS.

Japanned Iron Sheaves—

Inches	2	2½	3	3½	4	4½	5	6
Each ..	2d.	2½d.	3d.	4½d.	6½d.	9d.	1/-	2/-

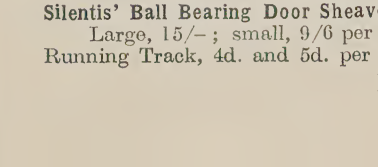
Barn Door Hangers, No. 14, 2/- ; No. 15, 2/6 per pair.
Ditto do. Lane's, No. 40, 2/9 ; No. 50, 3/3 per pair.
Bottom Rollers, 4in., 1/4 ; 5in., 1/10 per pair.
Hatfield's Patent Door Hangers, wrg. steel—

To run feet ..	2½	3	4	5	6	7	8
Each, with bolts ..	2/10	3/2	4/10	6/10	8/10	12/3	16/-

Door Rollers, each—

3/6	4/3	6/10	9/6	12/3	16/-	20/-

Kenrick's Pat. Anti-Friction Hangers, to run on iron bar—
To run 2ft., 3/- ; 3ft., 4/6 ; 5ft., 9/6 each.
Kenrick's wrg. Iron Cheek, to run 6ft., for Store door, 9/- each.
Lane's Overhead Single Door Rollers, steel track, lock and handles, set complete, 25/- ; track, 5d. per foot run.
McCabe's Pat. Ball Bearing Door Hangers, for Slide Doors—
For single doors, 3ft. opening, 16/9 ; 4ft., 22/6 per set.
Double doors, sets, 6ft. 6in. opening, 33/6 ; 8ft. opening, 40/-.
Cormack's Ball Bearing Rollers and Track, for Doors and Sashes—
Three sizes, ¼in. to ½in. thick, 12/- to 18/- per doz.



Silentis' Ball Bearing Door Sheaves, for Sliding Doors and Sashes—
Large, 15/- ; small, 9/6 per dozen.
Running Track, 4d. and 5d. per foot run.

HINGES.

Tee Hinges, japanned, without screws, 6in., 3/– ; 12in., 4/6 ; 18in. 7/6 per doz.

Tee Hinges, Heavy Scotch, self color, without screws, per doz., 12in., 8/6 ; 14in., 10/6 ; 18in., 16/– ; 24in., 23/6.

Gate Hinges, japanned, with hook to drive, 12in., 1/4 ; 18in., 2/3 per pr.
,, hook on plate, 12in., 1/7 ; 18in., 2/4 ; 24in., 4/4.
,, with hook to bolt through post, 12in., 2/– ; 18in., 3/– 24in., 4/6.

Extra Heavy Strap Hinges, per cwt., 28/–.

Spiral Springs, japanned, each, 6d. to 3/–.

BUTT HINGES.

Cast Butt Hinges, Inch. ..	1½	2	2½	3	3½	4	5
Per doz. ..	1/1	1/6	2/–	2/6	3/3	4/8	8/6
Cast Parliam't Hnges. In..	3	3½	4	4½	5	5½	6
Per doz. ..	6/6	8/3	10/–	12/–	14/–	15/6	17/6
Wrought Back Flaps. Inches	1	1¼	1½	1¾	2	2½	
Per doz. pairs	–/10	1/–	1/3	1/5	1/8	3/9	

Japanned Spring Hinges, 3in., per pair, 6d.

Steel Butt Hinges, 2in., 1/– ; 2½in., 1/3 ; 3in., 1/9 ; 3½in., 2/9 ; 4in., 3/6 per doz.

DOOR HINGES, SPRINGS AND CHECKS.

Helical Door Springs, 4in., 2/1 ; 5in., 2/6 each.

Helical Spring Hinges, iron, 3in., 4/3 ; 4in., 6/3 ; 5in., 9/– per pair, double action.

3in. Screen door Spring Hinge, 6d. ; double action, 1/6.

Brass Pin, Inches	2	2½	3	3½	4	
Per doz. pairs	4/–	6/–	10/–	14/3	28/–	
Steel Washered, per pair	2/6	3/–	3/6	5/10		

Brass Back Flaps, per doz. pairs—1in., 4/2 ; 1¼in., 5/7 ; 1½in., 6/6

CARTLAND'S DOUBLE ACTION SPRING HINGES.

Iron Inches	4	4½	5	6
per pair	6/–	7/–	8/–	—
Rule Joint Hinges, per pair	2/2	2/4	2/9	3/9
Smith's Patent Spring Hinge, each			20/–	25/–
Invisible Spring Hinge, each				32/6
Floor Spring and Check, for 1¾in. door, each				80/–

DOOR CHECKS.

	£	s.	d.
"Eclipse" Door Spring and Atmospheric Check, Tuscan Bronzed—			
For Light Doors, each	0	13	6
For Medium Doors, each	0	16	0
For Heavy Doors, each	0	19	6
"Norton" Door Spring and **Atmospheric Check,** Nickel-plated—			
For Ordinary Doors, each	1	0	0
For Heavy Doors, each	1	4	0
"Blount" Door Spring and **Liquid Check**—			
No. 1, for Light Doors, each	0	12	6
No. 2, for Medium Doors, each	0	17	6
No. 3, for Heavy Doors, each	1	1	0

BARREL AND TOWER BOLTS.

Brass Knob Barrel Bolts— Inches ..	3	4	5		
Each	2½d.	3d.	—		
Necked, each	3d.	3½d.	4d.		
Japanned Tower Bolts— Inches ..	4	5	6	8	10
Per doz.	2/9	3/6	4/3	5/6	7/–
Japanned Barrel Bolts, per doz.	5/–	6/9	8/3		

Japanned Chain Bolts, 8d., 10d., 1/3.
Tokio Bronze Chain Bolts, 3in., 1/–; 4in., 1/1; 6in., 1/3 each.
Berlin Black Spring Bolt, 8in., 2/–; 10in., 2/6; 12in., 3/– each.
Ditto, nutted, 6in. x ½in., 5d. each.
C.V. Centre Door Knobs, 6d. to 1/–; Knockers, 10d. to 1/8 each.

LATCH LOCKS AND RIM LOCKS.

Yale, 5/9. 3 keys; extra keys, 1/– each.
Sargent's or Vaughan's 3in. Rim Night Latch, 5/–. 3 keys.
English Latches, 1/6, 2/–, 2/9 each. 2 keys.
English Lever Latches, 3/–, 3/6, 4/6 each. 2 keys.
Chubbs' Latches, from 12/6 each. Extra keys, 2/– each.
Hobbs' Locking Latches, from 10/6 each. Extra keys, 1/3 each.
American Latches, with 2 flat keys, 1/3, 1/6, 1/9, 2/– each. Extra keys, 6d. each.
Vaughan's, 6in., 2/3 each, 23/6 doz.; 7in., 2/10 each, 31/– doz.
(Extra Rim Keys, 6d., 9d., 1/– each, according to size.)
American Rim Locks, from 1/– each, 10/6 per doz.
Reversible Rim Locks, English, 25/– per doz. 4 ways.
Ditto ditto "City," 33/– per doz. 4 ways.
Carpenter's Rim Lock, 25/– per doz.

DRAW-BACK LOCKS.

Carpenter's, 7in., 4/–, 4/6; 8in., 5/–, 5/3.
Vaughan's, 7in.. 3/3, 3/9; 8in., 3/6, 4/3. Extra keys, from 9d. each
American, 6in., 3/3 each.

DEAD LOCKS.

Hobbs' Lever, from 14/–. Keys, 1/3 each.
English, 4in., 1/–; 5in., 1/3; 6in., 1/6 each.
American Locks, 3in., 8d.; 4in., 1/–; 5in., 1/3; 6in., 1/6.

MORTICE LOCKS (without Furniture).

English Iron Bolts, 1 key, 5in., 1/6 each; 15/6 per doz.; 1/9 each, 19/– per doz.; 6in., 2/3 each, 25/– per doz.
Brass Bolts, 1 key, 5in., 1/9 each, 20/– per doz.; 2/– each, 22/6 per doz.; to 4/6 each, 51/– per doz.

AMERICAN MORTICE LOCKS.

3½in., 10d. each, 9/6 per doz.; 1/6 each, 17/– per doz.
4in., 1/6 each, 17/– per doz.
Full Rabetted Mortice Locks, 5in., 6/– and 6/6 each.
Lock Sets, "Elba," "Norwood," "Nouvelle," 2/9 to 3/6 set.
Other designs, 3/6, 5/–, 7/6, 10/–.

SASH LOCKS.

Sash Mortice Locks, 1½in., 2/6 each; 1¾in., 2/9; 2in., 3/– each.
Sash Mortice Locks, half rabetted, 1¾in., 3/–; 2in., 3/3; 2½in., 3/6 ea
Ditto, Full rabetted, 1¾in., 5/6; 2in., 5/6 each.
(Extra Keys to Mortice Locks, 1/– each.)
Brass Cabin Locks, from 8/– each. Brass Keys, 1/3 each.
Elevator Locks, 7/6 each.

PADLOCKS.

Galvanised, 2in., 2½in., 4/6; 3in., 6/9.
Japanned, 2in., 4/6; 2½in., 5/6.
Brass, 2in., 7/6; 2½in., 10/6; 3in., 12/6.
(Extra Keys, 1/– each.)
Chubbs' Padlock Bar, 8in. x 2½in., 11/6; 12in., 14/6
Spring Padlocks and 2 keys, 6d. to 3/–.

Chubb's Gun-metal **Roller Bolt** and Bronze Bushes...			4 in	5 in	6 in.	7 in.
2-Bolt Mortise, 2-lever			9/6	10/–	11/–	12/–
2-Bolt Mortise, 4-lever			11/–	11/6	12/–	13/6
Reversible **Latch Bolt, Hinge Segments,** for **Strong Room Doors** ..			10/9	11/6	12/–	13/6
Ditto	ditto	ditto ..	12/–	12/6	13/–	14/6
Ditto	ditto	ditto ..	12/–	12/6	13/–	14/6
Ditto	ditto	ditto ..	13/6	13/6	15/6	17/–

IRON WOOD SCREWS, NETTLEFOLD'S—

Length.	Gauge.	Per gross packets.
⅜ to ⅝	1 to 8	3½d. to 5½d.
¾ ,, 1	4 ,, 12	5d. ,, 8d.
1¼ ,, 1½	6 ,, 14	6½d. ,, 1/1
1¾ ,, 2	9 ,, 18	9½d. ,, 1/11
2½ ,, 3	10 ,, 18	1/1 ,, 2/11
3½ ,, 4	14 ,, 22	2/4 ,, 5/2

Nettlefold's Brass Wood Screws—

Length. Inches.	Gauge.	Per gross packets.
⅜ and ½	1 to 6	9½d. to 11d.
⅝ and ¾	2 ,, 10	10½d. ,, 1/9
1in.	6 ,, 12	1/6 ,, 2/8
1¼ to 1½	8 ,, 12	2/2 ,, 3/8
1¾ ,, 2½	10 ,, 14	3/6 ,, 7/–
3 ,, 4	12 ,, 18	7/8 ,, 15/3

SASH, CASEMENT AND FANLIGHT FITTINGS.

AXLE PULLEYS.

	s.	d.
Light Iron-frame pulleys, 1½in., per doz.	1	6
Iron-faced, secret, Kenrick's, 1¾in., per doz.	2	2
Brass-faced, secret, Kenrick's, 1¾in., 3/3; 2in., 4/3; 2½in.	7	0
Electro Bronze, secret, Kenrick's, 1¾in., 3/–; 2in. ..	3	6
Cross Axle Pulleys, gross 20/–; per doz.	1	9
Brass-faced ditto, per doz.	2	9

NAILS AND SPIKES.

(See Ironworker Table for number per 7lb. packet.)

Steel Wire Nails, per cwt.

Flat chequered or small diamond heads—

Gauges	4 to 7	8	9	10	11	12
Per case	15/6	16/–	16/6	17/–	17/6	18/6

Gauges	13	14	15	16	18	20
Per case	19/6	20/6	22/6	24/6	3d. lb.	4½d

Square Deck-Head Spikes, per cwt.—

Sizes				5 x ⅜	6 x ⅜	7 x ⅜	8 x ½
Black				23/–	22/6	22/–	21/6
Galvanised				28/–	27/–	25/–	—

Round Contractors' Spikes—per cwt.—

Black, Plain, 6 x ⅜in., 24/–; Black, Jagged, 7 x 7-16in., 25/–

Black Eared Dog Spikes—per cwt.—

Sizes, inches	2½ x 5-16	2½ x ⅜	3 x ⅜	3½ x ½	4 x ½
	30/–	29/–	21/–	20/–	20/–

Cut Nails, per lb., 3d. Galvanised, per lb. 0 4
Tramway Spikes, 2½ x 5-16, per cwt., 19/6; per lb. 0 2½
American Finishing Nails, in 1lb. packets 0 6
Steel Wire Brads, in ¼lb. packets 0 1½
Ew-banks Nails, black, per cwt., 20/–. Galvanised, per cwt. .. 25 0

Copper Staples, per lb. 1 6
Gal. Steel Staples, 23/– per cwt; per lb. 0 3
Gal. Wgt. Iron Staples, per lb. 0 4

Galv. Roofing Nails, 2 and 2½in., per cwt., 40/–; per lb. .. 0 6
Lead-Head Roofing Nails, 2in. to 2½in., per cwt., 25/–; per lb. 0 3
Galv. Springhead Roofing Nails (OE 1), in packets of 100 per 100 0 9

Zinc Slate Nails, 1⅛in. and 1¼in., per cwt., 54/–; per lb. .. 0 7
Galv. Slating Nails, 1⅛in. x 1¼in., per lb. 0 4½
Galv. CSK Head Clout Nails, 1in. to 2in., per lb. .. .. 6d. to 0 7

TACKS.

100 in packet, 8d. to 10d. per doz. packets.
Cut Copper Tacks, in 1-lb. packets, 1/4 per packet.
Copper Slating Nails, ⅞in. and 1in. x 16 gauge 1 4
Copper Rivets and Washers, in 1lb. packets 1 6
Linoleum Tacks, ⅝ x 16 and ¾ x 16, per lb. 0 3½
Galv. Tank Rivets and Washers, 5-16 x 3-16in., ⅜ x ¼in, per 7lb. packet, 2/6; per lb. 0 4½
Gold's Roofing Screws, 1¾in., per packet of 100 .. .. 0 9
Galvanised Roofing Screws, 7lb. packets, all sizes 3 6
Galvanised Roofing Bolts and Nuts and Washers, per doz. .. 0 4
Galvanised Iron Washers, per lb. 0 4
Lead Washers, in 28lb. bags, per lb., 3½d.; per cwt. 28 0
American Hand-rail Screws (OE 1a), 4in, 2½d.; 5in., 3d.; 6in. 0 5

Austral Patent Window Balance.

With Gun-Metal Plates.

Steel lacquered, stock sizes, per set, 13in., 8/– ; 16in., 10/6 ; 18in 12/6.

Transom Lifts.

Bronzed Fanlight Lifters, 3ft. x ¼, 10d. ; 4ft. x 5-16, 1/6 ; 5ft. x 3⅛, 1/9

Transom Rolls 4 x ¼, 11d. ; 3 x ¼, 10d. ; 4 x 5/16, 1/6.

Ditto, Antique, 3 x ¼, 1/6 ; 4 x ¼, 1/9 ; 4 x 5/16, 2/9.

Sash Fasteners, 3d., 4½d., 6d., 9d., 1/–, antique and brass.

Sash Lifts, 1/6, 2/–, 2/6 per doz.

Donald's Patent Casement Slide Stay, from 2/- 4/6 each. *See* advt. p. 39.

"**Forward**" Pat. **Sash Holder,** in lieu of sash weights, cords, or pulleys, or set for two sashes, from 4/–, in three sizes for 10, 20, and 35lb. sashes.

SASH CORD.

Sash Line, per knot of 12 yards each—

No.	1	2	3	4	5	6	7	8	9
Flax	6d.	7d.	9d.	1/–	1/2	1/4	—	—	—
Sup. Flax	10d.	11d.	1/3	1/7	1/11	2/3	2/4	2/9	—
Fine Twine	11d.	1/–	1/6	1/10	2/3	2/6	3/3	3/6	—
Bded. Cotton	—	—	—	—	—	1/6	1/9	2/–	—

3/16 **Flexible Steel Rope,** per 100ft 7/6

See Copper Rope, Index, Metal.

Linen **Blind Cord,** per knot, 3 doz. yards .. 1 2 to 1 4

Flax Venetian Blind Cord, ditto .. .. .. 1 3 to 1 9

Venetian Ladder Tape, per doz. yards, 2/3 ; Carr's Best Duck Tape, per doz. 3 6

Venetian Blind Actions, per doz. 2 3

Cast Iron Sash Weights, 3 to 24lbs., per cwt. 9 6

SASH AND CASEMENT FITTINGS.

Awning Pulleys, Galv. Inches	1	1¼	1½	2
Each	3d.	4d.	5d.	9d.
Lazy Pulleys, japanned, each	3½d.	4d.	5d.	7d.
Screw Pulleys, japanned, each	2½d.	3d.	3½d.	5d.
Upright Pulleys, each	2½d.	3d.	3½d.	4½d.
Side Pulleys, japanned—				
Single	2½d.	3d.	3½d.	4½d.
Double	4½d.	5d.	6d	—
Double Upright Pulleys, each	4½d.	5d.	6d.	8d.

Sash Pivots, japanned, 2¾in., per doz. pairs 2 0

Brass Casement Stays, 10in., 1/5 ; 12in., 1/7 ; 14in. 2 0

Bronzed ditto do., 10in., 10d. ; 12in., 1/– ; 14in. 1 6

Preston's Fanlight Openers, 20in. x ½in. .. 2 6 to 7 6

Cartland's Invisible ditto, to work with cords, Iron, 3/– ; Brass 4 7

Bronzed Casement Stays, 10in., 10d. ; 12in. 0 11

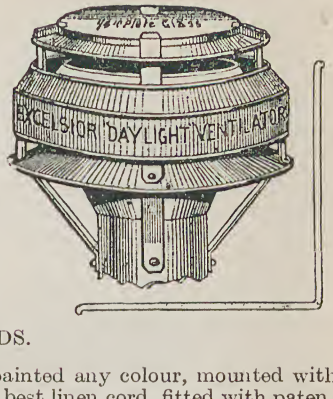
Blacket Patent Sash Cord Plates, set of 4 .. .. .. 1 0

Excelsior Pat. Daylight Ventilator,

For lighting and vetilating roofs, skylights, &c.

dia.	Price.
4in	12/–
6in.	16/–
9in.	25/–
12in.	37/–
15in.	60/–
16in.	80/–

See advt. page 3.



BLINDS.

Venetian Blinds, for inside use, painted any colour, mounted with Carr's Best Patent Ladder Tapes and best linen cord, fitted with paten check action, per ft. super., 6d. to 9d.

Sizes under 12 super. ft. charged as 12 super ft.

Venetian Blinds, outside use, fitted with iron rods and facia boards, Carr's best tape and linen cords ; painted any colour, 10d. to 1/–.

Sizes under 14ft. charged as 14ft.

Stock Sizes, half price ; 7ft. x 3ft. = 7/– per door.

Venetian Blind Actions (Check), per doz.	2 6
	Per ft. sup.
Canaletti blinds, linen tick, in panelled and moulded cases, painted complete	2 3
Florentine blinds ditto do.	2 6
Spanish blinds ditto do.	2 9
Oriental blinds, for circular-headed windows ditto	3 3
Hartshorn's Spring Shade Roller, 42in. x 1in. dia.	0 7½
48in. x 1¼ „	1 0
60in. x 1½ „	2 3
Holland, for window shades, 3ft. wide, per yard	6d. to 1 3
Ready-made Blinds, with rollers, 3ft. x 6ft. long	3 6 to 7 0

Gauze Fly Windows and Doors—	Pine.	Cedar.
Fitted with hinges, bolts, and locks, unpainted.	7d.	8d.
Varnished	8d.	10d.
Polished	9d.	11d.

Inter Gauze Wire and Perforated Zinc Screens, Cedar polished	2 0 to 3 0
Wire Gauze, green, per yard, 24in., 7d. ; 30in., 9d. ; 36in. ..	1 0
Galvanised, per yard, 24in., 9d. ; 30in., 1/– ; 36in.	1 3
Perforated Zinc, per sheet, 7 x 3	3 0
Plain sheet Zinc, per sheet, 7 x 3	4 9

MEASUREMENT.

All Smiths' and Cast Work is measured and generally valued by weight. The work should be measured in detail, and the weight ascertained by reference to the various tables given, or by roughly allowing 465lbs. to the foot cube. The patterns for castings are charged extra. The weight of castings may be ascertained from weight of pattern multiplied by table of constants as under for different metals. All screws and bolts—holes drilled, &c., should be *numbered.* Heavy castings should be kept separate from light or ornamental work.

Crestings and railings, &c., are usually taken by *the foot run.*

All work that has to be hoisted must be kept separate and charged for according to handling and height to be raised.

Wrought iron or steel framing work is also measured and charged by weight; all hoisting to be treated as above described. In the case of iron-framed roofs and R.S. joist framing the weight is generally taken and valued according to the amount of work in executing same. In smiths' work, such as railings, guard-bars to windows, &c., the plan is frequently adopted of giving the weight of the metal, reckoning all the labours in addition.

Light Grill and **Open** or **Mesh Work** Panel Work for Elevators, Gates, Staircases and Lift Wells are generally reckoned by the super foot.

Steel Windows and **Casement Frames** by the opening. Rolled steel mesh work generally by the super foot according to work.

MEMORANDA.

Test for Iron.—A soft tough iron, if broken gradually, gives long silky fibres of leaden-grey hue, which twist together and cohere before breaking.

Badly refined iron gives a short blackish fibre on fracture, a very fine grain denotes hard, steely iron, likely to be cold-short.

A medium, even grain, with denser fibres, shows good iron.

Coarse grain, with bright crystallised fracture, or discoloured spots, denotes cold-short, brittle iron, which works easily when heated, and welds well.

Cracks on the edge of a bar are indications of hot-short iron.

Good iron is readily heated, is soft under the hammer, and throws out few sparks.

Iron remains bright if touched with nitric acid.

Test for Steel.—Good steel in its soft state has a curved fracture and a uniform grey lustre; in its hard state a dull silvery uniform white.

Nitric acid will produce a black spot on steel; the darker the spot the harder the steel.

Cracks, threads, or sparkling particles denote bad quality.

Good steel will not bear a white heat without falling to pieces, and will crumble under the hammer at a bright red heat, while at a middling heat it may be drawn out, under the hammer, to a fine point. Care should be taken that before attempting to draw it out to a point the fracture is not concave, and should it be so, the end should be filed to an obtuse point before operating. Steel should be drawn out to a fine point and plunged into cold water; the fractured point should scratch glass.

To test its toughness, place a fragment on a block of cast-iron; if good, it may be driven by the blow of a hammer into the cast-iron; if poor, it will crush under the blow.

Testing Girders.—The easiest and cheapest way to test girders in pairs is to dig a trench longer and wider than the girders, which are laid in the trench with sufficient space between them to insert an hydraulic lift in the centre, the ends being easily fixed with wooden blocks; by pumping to exactly the pressure required each girder is fully tested.

Approximate Weight of Castings from the Pattern.—The weight of pattern in lbs. multiplied by *constants* given, will give the weight of casting in lbs. for the following metals:—

	C. Iron.	Zinc.	Brass.	Copper.	G. Metal.	Lead
White Pine or Deal, dry	15	15	18	19	19	25
Yellow Pine, dried ..	14	14	17.5	18	18	24
Clay dried (model) ..	4.	3.8	4.4	4.6	4.6	6
Plaster of Paris, ditto .	3.3	3.2	3.7	3.8	3.8	5

STEEL PIPES.

Spiral Riveted Steel Pipes, in lengths of about 20ft., from 6in. to 20in. diameter, coated with asphaltum composition, which prevents corrosion and ensures durability:—

Diameter.	Telescope Joints Per ft. s. d.	Cast Iron Bolted Joints. Per ft. s. d.	Flanged Joints. Per ft. s. d.
6in. x 14in. gauge ..	1 10	2 0	2 8
9in. x 14in. ,, ..	2 9	3 2	3 9
12in. x 14in. ,, ..	3 8	4 2	4 10
20in. x 14in. ,, ..	5 8	6 8	7 8

Quotations for quantities other diameters and thicknesses, Mephan Ferguson Prop. Ltd., Footscray, Melbourne. Prices f.o.b.

Wrought Steel Piping, thin, 24 gauge, per foot run:—

Diameter ..	3½in.	4in.	4½in.	5in.	5½in.	6in
Black	3d.	4d.	4½d.	5d.	5½d.	6d.
Galvanized ..	5d.	6d.	6½d.	7d.	7½d.	8d.

Wrought Steel "Lobster-back" elbows and bends, each:—

Black steel ..	1/-	1/1	1/2	1/3	1/4	1/6
Galvanized steel	1/4	1/5	1/6	1/7	1/8	1/9

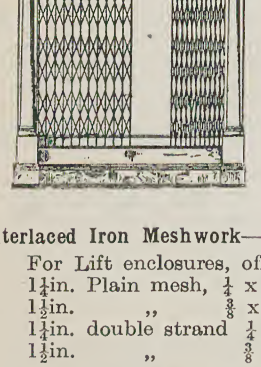
N.B.—Galvanizing wrought iron is said to make it brittle and unworkable so that it cannot be repaired or altered without extra cost. It also adds to the weight about 1½ ounces per sup. foot of surface galvanized, and about 2 ounces per sup. foot of cast iron galvanized.

WROUGHT IRON.

	From s. d.	To s. d.
Straps or T. hinges, with hooks and bolts	0 6	0 7
Screw bolts, nuts and washers, and king-post stirrups	0 5	0 6
Pile shoes, with straps and nails	0 4	0 6
Framed grating for sewers and sink-stones ..	0 4	0 5
Cradle bars, framed, 4d., ditto, trussed with screws and nuts	0 5	0 6
Wrought iron dog railing with cast iron spear-heads, 3ft. 6in. high x ¾in. dia. upright bars, fixed ..	6 0	p. ft. rn.
Gates, Ornamental, each hung from	£2 0 0	
Galvanising wrought iron, extra, per cwt.	18 0	24 0

SPECIAL WROUGHT IRON WORK.

Gates, Staircasing, Balustrating, and Balconette work, per super. foot	7 6	upwards.
Ornamental railings, for balconies, galleries, &c., per super. foot	7 6	,,
Heavy railing or guard rails, for basement windows, and plain grills, per super. foot	7 6	,,
Balusters for staircases, each, ornamental, from ..	10 0	,,
Ornamental wrought iron work, for grilles, railings, lift enclosures, &c., according to design, per sup.ft.from	6 0	,,



Collapsible Steel Gates and Shutters, for shop fronts, entrances, lift doors, &c., of public, private, or business premises; expanded measurement, per sup. ft. :—

For Gates 20ft. super. and over ½in. pickets, 5/–; ⅝in., 6/–; ¾in., 9/–.

Smaller sizes extra.

Add 1/– per ft. if hinged round.

See advt. pp. 2 & 45.

Larger quantities and areas at reduced prices.

A gate 4ft. 6in. wide will **collapse** into 4½in. wide, and a 10ft. gate into 12in.

Interlaced Iron Meshwork—

For Lift enclosures, offices—all gauges, per super ft.	s. d.
1¼in. Plain mesh, ¼ x 1/20in. iron	3 0
1½in. ,, ⅜ x 1/16in. ,, from	2 0
1¼in. double strand ¼ x 1/20in.	3 6
1½in. ,, ⅜ x 1/16in. from	2 6

In consequence of the great variety of shapes, sizes, sections, and qualities, it is impossible here to quote prices in detail. The average

cost of a casement and frame made to certain sizes, ready to receive glass in one pane, with square head and hinged to open outwards, with fastenings complete, according to the design, at per foot super., 4/– to 6/–.

For details, *see* advt. page 20 and 37.

STEEL CASEMENTS AND SASHES.
The "Fenestra" Intersection Joint.

A small cross slot is made in the vertical bar and shaped to receive the flange and moulding of the horizontal bar to pass through; the moulded portion is then pressed out so as to fold closely round the mould of the horizontal bar. It has a small notch made to act as a lock. The amount of metal removed in making a "Fenestra" joint is in its favour compared to the usual mitred joint.

Rolled Mild Steel Sashes and Frames, 1 x ½in. upwards, casement or pivot hung, with or without frames, per sup. ft, unfixed, from 4/–.

REVERSIBLE CASEMENT.
The Marks' Patent.

Width of Casement.	Length of Arm.	Stee Arms per set.	Steel Arms, Steel Channels.	Steel Arms, Steel Channels, with peg stays.	Gun-metal Arms. Steel Channels,
		s. d.	s. d.	s. d.	£ s. d.
12in. to 15in.	6in. to 7½in.	8 6	12 6	15 0	0 17 6
18in. to 21in.	9in. to 10½in.	8 6	12 6	15 0	0 18 6
24in. to 27n.	12in.to 13½in.	8 6	12 6	15 0	1 0 0
30in.	15in.	8 6	13 6	16 0	1 5 0
33in.	16½in.	9 6	14 0	16 6	1 6 6
36in.	18in.	9 6	14 6	17 0	1 8 0

Complete sets in steel consist of 2 steel arms with gun-metal hinges, 2 gun-metal plates and pins for top and bottom of casement. When ordering give exact width of sash, and whether for single or double casements, and if steel channels and gun-metal clamp are wanted.

Complete sets and peg tags consist of 2 brackets, 2 gun-metal plates and pins for top and bottom of sash. Prices as above list in first column. If supplied with gun-metal clamp, 2/6 extra.

Rolled Steel Reversible Casements (Marks' patent), from 6/6 per super. foot unfixed.

The above steel sashes are sometimes built in during erection of building, with ties at side and lead plugged, or lead joints made.

"Waterloo" Steel Window Frames, from 4/– per super ft., Melbourne.

Rolled Steel Framings for Domes and Conservatories. For prices and details *see* advt. pages 37 & 20.

Ornamental Punched Steel Sheets, plain and embossed, from 14in. to 19in. gauge up to 8ft. x 4ft., suitable for lift enclosures, open panels, &c., per square foot .. 9d. to 1/6

"Waterloo" Steel Roller Shutters, from 4/6 per super ft. at Melbourue.

For Partitions, Openings Factories and Shops, *see* ad. p. 20, Melbourne.

See Patent Partitions, &c., advt. page 17, Sydney.

Mild Rolled Steel Ovolo Moulds (with stop ends).
For staff bends and external angles, plain and ornamental.
1½in. to 2½in. wide, per foot, from .. .. .. 4d. to 8d.
Rolled Steel Ornamental Balusters, Mouldings, Hand Rails, *For details, designs, &c., see advt. page* 37.

Cutting Rolled Steel Girders through with Oxygen.

The Knowles Oxygen Co. of Birmingham gives the cost of cutting through 15in. x 15in. R.S. girders at 42 different places :—

	£	s.	d.
Oxygen used, 200 c. ft., at £2 per 1000 c. ft.	0	8	0
Hydrogen used, 300 c. ft., at £1 per 1000 c. ft.	0	6	0
Labour and Time Specialist working machine, 5 hours at 2/–	0	10	0
Net cost	1	4	6

About 6d. per cut.)

GIRDERS.

Compound Girders, up to 2ft. deep, for general building purposes, are usually made by one or more steel joists riveted to plates top and bottom, which give additional strength to the joists in compression and tension strains according to thickness of plates.

Thus, two joists, 18in. x 7in. at 20ft. span (see combined safe load, as per table steel joists, 32 tons each) = 64 tons ;

But with two plates, 16in. x ⅝in. riveted to top and bottom flanges, the combined safe load should be 82½ tons, increasing the strength 25 per cent. or more.

Compound Girders, English brand, with top plate riveted on every 12 inches, 20/– per cwt.

Ditto, top and bottom plates riveted on, 19/– per cwt.

Hoisting and setting, reckon 2/– to 3/– per cwt. per floor.

STEEL GIRDER BRIDGES.

Labour only. Per cwt. including scaffolding.

Wages of Fitter, 1/6, and Holder-up, 1/1½ per hour.

	£	s.	d.
Fitting and riveting large lattice girders, previously put together, over land bays and spans	0	4	4
Ditoo, ditto, over water, rivers, &c.	0	5	0
Riveting only, per 100 rivets, from 11/– to	0	12	6
Ditto, ditto, with machine, from 3/3 to	0	4	2
Making, punching, riveting, constructing, fitting, and fixing large plate girders for bridges, &c.	0	15	0
Ditto, lattice or triangular girders, or large tanks ..	1	0	0
Ditto, small box or plate girders for floors, shop windows, &c., small tanks, caulked	1	2	0

Add 25 per cent.

Steel Girder Bridges, general average price, per ton, £28.

Wrought Iron Girders.

The following table for wrought iron girders is for such spans as are most in use without the intervention of columns. To support walls and heavy machinery, the box girder will be found the best, but for loaded floors, the plate girder offers many advantages :—

Spans.	Height of 18 inch walls supported.	Constant load of walls, floors and roofing.	Sectional area of bottom of girder.	Sectional area of top of girder.	Depth of girder.	Thickness of vertical plates.	Angle irons.
10 ft.	10 ft.	13 ton.	5 in.	6 in.	9 in.	3-16 in.	in. $3\times3\times\frac{3}{8}$ $2\frac{3}{4}\times2\frac{3}{4}\times\frac{3}{8}$ $2\frac{1}{2}\times2\frac{1}{2}\times\frac{3}{8}$
do.	15 ,,	18 ,,	6 ,,	7 ,,	do.	do.	
do.	20 ,,	24 ,,	$8\frac{1}{2}$,,	10 ,,	do.	do.	
15 ft.	10 ,,	20 ,,	8 ,,	9 ,,	12 in.	$\frac{1}{4}$ in.	in. $3\times3\times\frac{3}{8}$ $2\frac{3}{4}\times2\frac{3}{4}\times7\text{-}16$ $2\frac{1}{2}\times2\frac{1}{2}\times\frac{3}{8}$
do.	15 ,,	26 ,,	10 ,,	12 ,,	do.	do.	
do.	20 ,,	35 ,,	$13\frac{1}{2}$,,	15 ,,	do.	do.	
20 ft.	10 ,,	5 ,,	$9\frac{1}{2}$,,	11 ,,	16 in.	5-16 in.	
do.	15 ,,	35 ,,	$13\frac{1}{2}$,,	15 ,,	do.	do.	
do.	20 ,,	46 ,,	18 ,,	21 ,,	do.	do.	

These beams are calculated to break with about four times the loads, in tons, here mentioned.

Wrought iron plate girders, of the same strength as the box girders, given above, may be made by increasing the area of the top and bottom plates ½ inch, the thickness of the vertical plates for the 10 feet girders ⅜ inch, and the 15 and 20 feet girders, 3-16ths inch.

In plate iron girders, not only the sectional areas must be correct, but also the perfect arrangement of the joints must be attended to.

ALL JOINTS should butt close together, covered with proper jointing strips, and no two joints should occur in the same place. In punching the plates and angle irons, the sectional areas should be diminished only to the extent necessary for rivets of the proper size : and plates, &c., imperfectly punched, should be rejected.

THE RIVETS should be of Lowmoor or other superior iron, and where the strain depends on them, their *collective areas should equal the sectional areas of the plates connected.*

All girders should be so secured on walls as to admit of expansion and contraction.

CIRCULAR IRON SPIRAL STAIRCASE.

5ft. diam, fixed per foot in height from floor to floor.. .. 2 15 0
4ft. 6in. diam., do. do. do. 2 10 0

The expansion of Cast Iron, 100 ft. in length, by an increase of 100 degrees of heat (Fahrenheit) — about ¾ of an inch.

The expansion of Bar Iron — about 9-10ths. of an inch.

DIVER AND CYLINDER.

Diving Apparatus complete in the Australian cities from £135 to £175.

Two men can work the air pump to a depth of 51 feet.

In a diving bell men can work for several hours at this depth under a pressure of 37½lbs. per square inch. At a depth of 90 feet they can work only for about an hour without seriously suffering from paralysis.

Iron cylinders, for bridges, wharves, &c., are sunk by Triger's *plenum process,* which consists in forcing air into the cylinder to such an extent as to force out the water below the bottom of the cylinder, leaving the earth or soil nearly dry; the men pass in and out of the cylinder by an *air lock,* which is generally of the same diameter as the cylinder, and about 6ft. high; it is secured to the top of the cylinder, and is fitted with air-tight valves at top and bottom, through which the men pass. These men are entirely at the mercy of those employing them, and may be injured for life by paralysis, caused by working too long, or at too great a depth. The laws relating to the supply of air, &c., are similar in their results to those relating to the diving dress and diving bell. The iron cylinders of the Darling Harbour Wharf, Sydney, and the Parramatta River iron girder bridge, near Sydney, were sunk by the *plenum process.* See "Trautwine's Engineer's Pocket Book." See Metal Worker.

STEEL STRONG ROOM DOORS.

With Flat Bar Frame.

Hung on hard steel centres in frames. Fitted with working bolts at front and back edges of the doors for security. The doors are lined throughout with non-conducting and fire resisting composition. The working bolts are secured with Chubb's Patent Anti-Explosive Lock with duplicate keys. The doors are fitted with a patent drill preventative, and the locks are further protected with a layer of armour plate.

*Sizes kept in Stock.

Sizes.	Quality A has no Fire Resisting Chamber. Quality A.	Quality B.	Quality C.
ft. in. ft. in.	£ s. d.	£ s. d.	£ s. d.
6 0 x 2 6	24 15 0	33 0 0	36 5 0
6 0 x 3 0	28 5 0	34 12 6	41 15 0
*6 2 x 2 8	27 10 0	35 5 0	40 5 0
6 6 x 2 6	25 17 6	33 12 6	36 17 6
*6 6 x 3 0	30 5 0	39 0 0	43 10 0

Sizes,	Quality D. with Lock.	Quality E., with Lock.
ft. in. ft. in.	£ s. d.	£ s. d.
5 9 x 2 3	26 7 6	29 10 0
6 0 x 2 4	31 2 6	35 12 6
6 2 x 2 6	35 0 0	42 12 6
6 2 x 2 8	40 2 9	48 10 0
6 6 x 2 6	39 0 0	47 5 0
6 6 x 3 0	49 5 0	59 12 6
6 9 x 3 4	57 0 0	69 2 6

All sizes stocked. Quality E. used for Branch Banks.

Chubbs' Strong Room Steel Plate Shelving, with perforated uprights for spacing, per lb., 6d. Detail prices for quantities on application.

TABLE exhibiting the weight of a lineal foot of square and round Bar Iron.

Side and diam. in inches.	Square in lbs.	Round in lbs.	Side and diam. in inches.	Square in lbs.	Round in lbs.	Side and diam. in inches.	Square in lbs.	Round in lbs.
1/4	.21	.16	1 1/8	7.52	5.91	3 1/8	40.92	32.17
5/16	.33	.26	1 5/16	8.83	6.93	3 5/16	43.89	34.47
3/8	.47	.37	1 3/8	10.23	8.04	3 3/8	46.97	36.90
7/16	.64	.50	1 7/16	11.74	9.22	3 7/16	50.15	39.39
1/2	.84	.66	2	13.36	10.50	4	53.44	41.98
9/16	1.06	.83	2 1/8	15.08	11.85	4 1/8	56.83	44.64
5/8	1.31	1.03	2 1/4	16.91	13.28	4 1/4	60.33	47.39
11/16	1.58	1.24	2 3/8	18.84	14.80	4 3/8	63.93	50.21
3/4	1.88	1.48	2 1/2	20.88	16.40	4 1/2	67.64	53.13
13/16	2.21	1.73	2 5/8	23.12	18.15	4 5/8	71.45	56.11
7/8	2.56	2.01	2 3/4	25.26	19.84	4 3/4	75.36	59.19
15/16	2.94	2.31	2 7/8	27.61	21.68	5	83.51	65.59
1	3.34	2.62	3	30.07	23.65	5 1/4	92.46	72.62
1 1/8	4.23	3.32	3 1/8	32.62	25.62	5 1/2	101.04	79.37
1 1/4	5.22	4.10	3 1/4	35.28	27.71	5 3/4	110.43	86.73
1 3/8	6.32	4.96	3 3/8	38.05	29.88	6	120.24	94.61

WEIGHT OF BOLT HEADS AND NUTS IN LBS.

Diam of Bolts in ins.	1/4	3/8	1/2	5/8	3/4	7/8	1	1 1/4	1 1/2	1 3/4	2	2 1/2	3
Weight of Hex. nut and head	.017	.057	.128	.267	.43	.73	1.10	2.14	3.78	5.6	8.75	17.	28.8
Do. Square nut & head	.021	.069	.164	.32	.55	.88	1.31	2.56	4.42	7.2	10.5	21.	36.4

WEIGHTS OF SQUARE AND ROUND STEEL.

From Jaffrays' Handy Tables.

IN LBS. PER LINEAL FOOT.

Diameter.	Square Steel.	Round Steel.	Diameter	Square Steel.	Round Steel.
Inches.	Lbs.	Lbs.	Inches.	Lbs.	Lbs.
3/16	·120	·094	2	13·60	10·68
1/4	·213	·167	2 1/16	15·35	12·06
5/16	·332	·261	2 1/4	17·21	13 52
3/8	·478	·376	2 3/8	19·18	15 06
7/16	·651	·511	2 1/2	21·25	16·69
1/2	·849	·668	2 5/8	23·43	18·40
9/16	1·076	·845	2 3/4	25·71	20·19
5/8	1·328	1·043	2 7/8	28·10	22·07
11/16	1·607	1·262	3	30·60	24·03
3/4	1·912	1·502	3 1/4	35·91	28·21
13/16	2·245	1·763	3 1/2	41·65	32·71
7/8	2·603	2·044	3 3/4	47·81	37·55
15/16	2·988	2·347	4	54·40	42·73
1	3·400	2·670	4 1/4	61·41	48·23
1 1/8	4·303	3·380	4 1/2	68·85	54·07
1 1/4	5·312	4·172	4 3/4	76·71	60·25
1 3/8	6·428	5·049	5	85·00	66·76
1 1/2	7·650	6·008	5 1/4	93·71	73·60
1 5/8	8·978	7·051	5 1/2	102·85	80·78
1 3/4	10·412	8·178	5 3/4	112·41	88·29
1 7/8	11.953	9·388	6	122·40	96·13

SQUARE AND ROUND IRON.—Per Foot Run.

At 2d. per lb., or 18/8 per cwt.

In.	Square.		Round.		In.	Square.		Round.		In.	Square.		Round.	
	s.	d.	s.	d.		s.	d.	s.	d.		s.	d.	s.	d.
1/4	0	0 1/2	0	0 1/2	1 1/8	0	8 1/2	0	7	2	2	3	1	9
3/8	0	1	0	1	1 1/4	0	10 1/2	0	8 1/2	2 1/8	2	6	2	0
1/2	0	2	1	1 1/2	1 3/8	1	1	0	10	2 1/4	2	10	2	2 1/2
5/8	0	2 1/2	0	2	1 1/2	1	3	1	0	2 3/8	3	2	2	6
3/4	0	4	0	3	1 5/8	1	6	1	2	2 1/2	3	6	2	9
7/8	0	5	0	4	1 3/4	1	8 1/2	1	4	2 5/8	3	10	3	0
1	0	6 1/2	0	5	1 7/8	1	11 1/2	1	6 1/2	2 3/4	4	2 1/2	3	3

Steel.—For rod and bar steel per lineal foot reckon three times the above prices, or 6d. per lb., which is about the present price,

ANGLE AND TEE IRON.

Weight per Foot.

Size.	Thickness.	Weight. lbs.	Size.	Thickness.	Weight lbs.
¾ x ¾	3/16	0.86	2½ x 2½	5/16	4.93
1 x 1	3/16	1.16	2½ x 2½	⅜	5.88
1 x 1	¼	1.56	2½ x 2½	7/16	6.82
1¼ x 1¼	¼	1.95	2½ x 2½	½	7.75
1¼ x 1¼	5/16	2.38	3 x 3	5/16	5.95
1½ x 1½	⅜	2.36	3 x 3	⅜	7.11
1½ x 1½	5/16	2.91	3 x 3	7/16	8.25
1½ x 1½	⅜	3.46	3 x 3	½	9.44
1¾ x 1¾	5/16	3.40	3½ x 3½	5/16	7.05
1¾ x 1¾	⅜	4.04	3½ x 3½	⅜	8.34
2 x 2	¼	3.16	3½ x 3½	7/16	9.70
2 x 2	5/16	3.91	3½ x 3½	½	11.04
2 x 2	⅜	4.66	3½ x 3½	9/16	12.34
2 x 2	7/16	5.39	4 x 4	5/16	8.67
2 x 2	½	6.04	4 x 4	⅜	9.65
2¼ x 2¼	5/16	4.42	4 x 4	7/16	11.16
2¼ x 2¼	⅜	5.27	4 x 4	½	12.70
2¼ x 2¼	7/16	6.10	4 x 4	9/16	14.17
2¼ x 2¼	½	6.93	5 x 5	½	15.50

WEIGHTS OF FLAT BAR STEEL.

In lbs. per Lineal Foot.

Breadth in ins.	Thickess in fractions of an inch.								
	4-16	5-16	6-16	7-16	8-16	10-16	12-16	14-16	1 in.
1	·85	1·06	1·28	1·49	1·70	2·13	2·55	2·98	3·40
1⅛	·96	1·20	1·43	1·67	1·91	2·39	2·87	3·35	3·83
1¼	1·06	1·33	1·59	1·86	2·13	2·66	3·19	3·72	4·25
1⅜	1·17	1·46	1·75	2·05	2·34	2·92	3·51	4·09	4·68
1½	1·28	1·59	1·91	2·23	2·55	3·19	3·83	4·46	5·10
1¾	1·49	1·86	2·23	2·60	2·98	3·72	4·46	5·21	5·95
2	1·70	2·13	2·55	2·98	3·40	4·25	5·10	5·95	6·80
2¼	1·91	2·39	2·87	3·35	3·83	4·78	5·74	6·69	7·65
2½	2·13	2·66	3·19	3·72	4·25	5·31	6 38	7·44	8·50
2¾	2·34	2·92	3·51	4·09	4·68	5·84	7·01	8·18	9·35
3	2·55	3·19	3·83	4·46	5·10	6·38	7·65	8·93	10·20
3¼	2·76	3·45	4·14	4·83	5·53	6·91	8·29	9·67	11 05
3½	2 98	3 72	4·46	5·21	5·95	7·44	8·93	10 41	11·90
4	3·40	4·25	5·10	5·95	6·80	8·50	10·20	11·90	13 60
4½	3·83	4·78	5·74	6·69	7·65	9·56	11·48	13·39	15·30
5	4·25	5·31	6·38	7·44	8·50	10·63	12·75	14·88	17 00
6	5 10	6·38	7.65	8·93	10·20	12·75	15·30	17·85	20 40

WEIGHT OF 100 BOLTS AND NUTS.

In Lbs. and Decimals.

Length of Bolt in inches.

Heads & Nuts.	2	2½	3	3½	4	4½	5	5½	6	6½	7
¼″ dia. Hexagon	4.36	5.	5.7	6.3	7.	7.7	8.36	9.	9.7	10.3	11.
¼″ diam. Square	4.7	5.4	6.1	6.7	7.4	8.1	8.7	9.4	10.1	10.7	11.4
⅜″ diam. Square	11.8	13.4	14.9	16.4	18.	19.6	21.1	22.6	24.2	25.7	27.2
⅜″ diam. Square	13.	14.6	16.1	17.6	19.2	20.8	22.3	23.8	25.4	26.9	28.4
½″ dia. Hexagon	23.8	26.5	29.3	32.	34.7	37.6	40.2	43.	45.8	48.5	51.2
½″ diam. Square	27.4	30.1	32.9	35.6	38.3	41.2	43.8	46.6	49.8	52.1	54.8
⅝″ dia. Hexagon	43.8	48.1	52.4	56.7	61.	65.4	69.6	73.9	78.2	82.4	86.7
⅝″ diam. Square	49.1	53.4	57.7	62.	66.3	70.7	74.9	79.2	83.5	87.7	92.
¾″ dia. Hexagon	67.6	73.	80.	86.1	92.3	98.	104.	111.	117.	123.	129.
¾″ diam. Square	79.6	85.	92.	98.1	104.	110.	116.	122.	129.	135.	141.
⅞″ dia. Hexagon	106.	114.	123.	131.	140.	148.	156.	165.	173.	182.	194.
⅞″ diam. Square	121.	129.	138.	146.	155.	163.	171.	180.	188.	197.	205.
1″ dia. Hexagon	153.	164.	175.	185.	196.	208.	218.	229.	240.	251.	262.
1″ dia.	174.	185.	196.	206.	217.	229.	239.	250.	261.	272.	283.

WEIGHT OF 100 BOLTS AND NUTS (Continued).

In Lbs. and Decimals.

Length of Bolt in Inches.

	8	9	10	11	12	13	14	15	16	17	18
¼″ dia. Hexagon	12.3	13.7	15.	16.3	17.7	19.	20.3	21.7	23.	24.3	25.7
¼″ dia. Square	12.7	14.1	15.4	16.7	18.1	19.4	20.7	22.1	24.4	24.7	26.1
⅜″ dia. Hexagon	30.3	33.4	36.5	39.5	42.7	45.7	48.9	51.9	55.	58.1	81.2
⅜″ dia. Square	31.5	34.6	37.7	40.7	43.9	46.9	50.	53.1	56.2	59.3	82.4
½″ dia. Hexagon	56.7	62.3	67.7	73.1	78.8	84.1	89.7	95.3	100.	106.	111.
½″ dia. Square	60.3	65.9	71.3	76.7	82.4	87.7	93.3	99.	104.	110.	115.
⅝″ dia. Hexagon	95.3	104.	112.	121.	129.	138.	146.	155.	164.	172.	183.
⅝″ dia. Square	100.	109.	117.	126.	135.	143.	152.	161.	169.	178.	188.
¾″ dia. Hexagon	141.	154.	166.	178.	191.	203.	215.	228.	240.	252.	265.
¾″ dia. Square	153.	166.	178.	190.	203.	215.	227.	230.	252.	264.	277.
⅞″ dia. Hexagon	211.	227.	240.	257.	278.	291.	307.	324.	340.	358.	379.
⅞″ dia. Square	222.	238.	255.	272.	289.	306.	322.	339.	355.	373.	394.
1″ dia. Hexagon	283.	305.	326.	348.	370.	391.	413.	435.	456.	478.	500.
1″ dia. Square	304.	326.	357.	369.	391.	412.	434.	456.	477.	499.	521.

For over 18 inches long, add for every inch, per gross (or 144 bolts), as under :—

Bolts, inches diam.	⅜	½	⅝	¾	⅞	1
Lbs.	5	8	12	18	24	32

TABLE of the weight of a lineal foot of flat Bar Iron, in lbs.

Breadth in inches.	Thickness in parts of an inch.								
	1/4	9/16	5/8	11/16	1/2	5/8	3/4	7/8	1
1	·84	1 04	1·25	1·46	1·67	2·09	2·51	2·92	3·34
1 1/8	·94	1·17	1·41	1·64	1 88	2·35	2·82	3·29	3 76
1 1/4	1·04	1·31	1·57	1·83	2·09	2·61	3·13	3·65	4 18
1 3/8	1·15	1 44	1·72	2·01	2 30	2·87	3·44	4·02	4·59
1 1/2	1·25	1·57	1 88	2·19	2·50	3·13	3·76	4·38	5·01
1 5/8	1·36	1 70	2·04	2·37	2·72	3 39	4·07	4·75	5·43
1 3/4	1 46	1 83	2 19	2·56	2 92	3·65	4 38	5 11	5 85
1 7/8	1 57	1 96	2 35	2·74	3·13	3·91	4 70	5·48	6 26
2	1·67	2·09	2 51	2 92	3·34	4·18	5·01	5·85	6·68
2 1/4	1·88	2 35	2·82	3·29	3 76	4 70	5·64	6·58	7·52
2 1/2	2 09	2·61	3·13	3 65	4·18	5·22	6 26	7·31	8 35
2 3/4	2 30	2·87	3·44	4·02	4 59	5·74	6·89	8·04	9·19
3	2·51	3·13	3·76	4·38	5·01	6 26	7·52	8·77	10·02
3 1/4	2 72	3·39	4·07	4 75	5·43	6 78	8·14	9·50	10·86
3 1/2	2·92	3·65	4·38	5·11	5·85	7·31	8·77	10·23	11·69
3 3/4	3 13	3·91	4 70	5·48	6·26	7 83	9·39	10 96	12 53
4	3 34	4·18	5 01	5 85	6·68	8·35	10 02	11·69	13 36
4 1/4	3·55	4·44	5 32	6 21	7·10	8·87	10 65	12·42	14·20
4 1/2	3·76	4·70	5·64	6·58	7·52	9 39	11 27	13·15	15·03
4 3/4	3 97	4·96	5·95	6 94	7·93	9 92	11·90	13·88	15·86
5	4·18	5·22	6 26	7·31	8·35	10·44	12·53	14·61	16·70
5 1/4	4 38	5·48	6·58	7·67	8·77	10 96	13·15	15·34	17 54
5 1/2	4 59	5·74	6·89	8·04	9·19	11·48	13·78	16·07	18·37
5 3/4	4·80	6·00	7·20	8·40	9·60	12 00	14·40	16 80	19·20
6	5 01	6·26	7·52	8·77	10 02	12·52	15·03	17 54	20·04

Casting Statues.—As a sample of Colonial work I refer to the bronze statue of Mercury over the *Evening News* office in Sydney. The statue, including the globe, is about 10ft. high, weighs 10cwt., and cost £120 for sculptor and £90 for founder, including patterns and fixing. *See* Metal Worker.

Plate Iron Tanks cost about the same by weight as girders, with the addition of the cost of caulking, which is about equal to riveting. The sides of the plates should not butt as in girders, but should lap, and be double riveted, by which means much labour is saved, and the joints effectually caulked; this is almost impossible when the plates butt, even if the edges are shot or planed.

400 gal. tanks, square, from £3. Setting up to be added.

WASHERS per 100.

1/4 inch..	1 3/4 lbs.	1 inch	10 3/4 lbs.
1/2 inch...	2 1/2 lbs.	1 1/8 inch	18 3/4 lbs.
5/8 inch..	4 1/2 lbs.	1 1/4 inch	24 lbs.
3/4 inch..	6 3/4 lbs.	1 1/2 inch	30 lbs.
7/8 inch..	8 1/2 lbs.		

WROUGHT STEEL.

The use of Steel for ordinary constructional purposes aided by improved machinery has completely displaced wrought iron, at about the same cost, and as it possesses much greater tensile strength than this, it is obviously more economical to use it.

Roofs.

Roofs with trussed principals and purlins of ordinary spans, framed of tees, angles, flat bars, &c., including all holes, bolts, base plates, connections, &c., complete, and including erection £1 3s. 6d. per cwt. upwards.

Rolled Steel Joists, cut to lengths, from 13d. 6s. per cwt. upwards.

Rolled Steel Joists, Framed Reinforcement, for buildings—
Girders, from 14s. 3d. per cwt. Stanchions, from 17s. per cwt.
Labour on above and profit—4s. to 8s.

WROUGHT IRON.

Per cwt., Current Prices.

	s. d.	s. d.
Wrought bar, round or half-round iron	11 0 to	13 0
Best Charcoal Iron	18 0 to	20 0
Sheet Iron, 10 to 28 gauge	14 0 to	18 0
Plate Iron, best charcoal plate, ⅛in. to ⅝in. thick	16 0 to	20 0
Angle T and channel iron	14 0 to	15 0

N.B.—For large " Lines " *see* Weekly List.

WROUGHT IRON. Fixed, per lb.	From s. d.	To s. d.
Wharves.—Wrought iron in straps, shoes, rings and straps of mooring or other piles, anchor and other bolts and dumps for planking	0 4	0 6
Bridges.—Bolts from 15in. to 36in. long, including tie-bolts for king posts	0 4	0 5
Wrought Iron cell doors for gaols, including hinges, straps, staples and fastenings, fixed complete, about £6 12s. each .. .. .. or	0 8	0 9
Plain square balusters for stairs, &c.	0 3	0 4
Iron hand-rail and square balusters, including fixing and lead	0 6	0 7
Iron roofs complete, including angle, T. and rod iron for rafters, struts, king and queen posts, tie-rods, &c.	0 4	0 5
Gates and Girders—		
Framed gates, with hinges and cast spear heads, &c., fixed, per lb.	0 6	0 7
Hydraulic stamped spear heads, rosettes, &c., fixed, per lb.	0 9	0 10
Wrought iron plate and box girders, colonial ..	0 2½	0 3½

WROUGHT IRON.

Labour.

Hanging a pair of iron gates with portable or other crane, gates about 3 tons, 8 men, 10 hours ..	100	0	120	0
Hanging single or side-gates, with above, everything prepared	25	0	30	0
Guard bars, with strap ends, unframed, for windows of stores, gaols, &c., per lb.	0	4	0	5
Strong brackets, framed with braces	0	6	0	8
Iron work for pumps	0	7	0	9
Plate Iron Tanks	0	2½	0	3½
Chimney and Arch bars	0	3	0	3½
Ties and straps in floors and roofs	0	4	0	5

See R. L. Scrutton & Co.'s advt., back cover, for quotations.

WEIGHT OF 100 IRON PAN-HEADED RIVETS IN LBS.

Length under head to point.
Diameter of Rivets in inches.

	5-16	6-16	7-16	8-16	9-16	10-16	12-16	14-16	1 in.
ins.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
½	2·06	3·26	4·83	6·82	9·28	12·25	19·94	30· 8	43·63
⅝	2·33	3·64	5 35	7·50	10·14	13 32	21·48	32·36	46 36
¾	2·60	4·03	5·87	8·18	11 00	14·38	23·01	34·45	49·09
⅞	2 86	4·41	6·39	8·83	11·86	15·45	24·54	36·54	51 81
1	3·13	4·79	6·92	9·54	12·73	16·51	26·08	38·63	54·54
1¼	3·66	5·56	7·96	10·91	14·45	18·64	29·15	42·80	60·00
1½	4·19	6·33	9·00	12·27	16·18	20·77	32·21	46·98	65·45
1¾	4·73	7·09	10·05	13·64	17·91	22·90	35·28	51·16	70·90
2	5·26	7·86	11·09	14·99	19·63	25·03	38·35	55·33	76·36
2¼	5·79	8·63	12·14	16·36	21·36	27·17	41·42	59·51	81·81
2½	6·32	9·40	13·18	17·73	23·08	29·30	44·49	63·68	87·27
2¾	6·86	10·17	14·22	19·09	24·81	31·43	47·55	67·86	92·72
3	7·39	10 93	15·27	20 45	26·53	33·56	50·62	72·04	98·18
3¼	7·92	11·70	16·31	21·82	28·26	35·69	53·69	76·21	103·63
3½	8·45	12·46	17·36	23·18	29·99	37 82	56·76	80·39	109·08
3¾	8·99	13·23	18·40	24 54	31·71	39·95	59·8'	84·56	114 54
4	9·52	14·00	19·44	25 91	33·44	42·08	62 89	88·74	119·99

Useful Cements.

Rust for Iron.—Wrought iron filings, 65 parts ; sal-ammoniac, 2½ ; sulphur (flowers), 1½ ; sulphuric acid, 1. Mix dry, sulphuric acid with sufficient water then added.

Iron Pipes.—Wrought-iron filings, 45 parts ; clay, 20 ; china clay, 15 ; common salt solution, 8. If china clay cannot be found, fireclay will do.

Iron to Stone.—Fine iron filings, 10 parts ; plaster of Paris, 30 ; sal-ammoniac, ½. Mix with weak vinegar, and use at once.

WEIGHT OF STEEL JOISTS, AND SAFE CARRYING LOAD.

Standard Sections, British.

A—Depth of Joist. C—Thickness of web.
B—Width of Flange. D—Thickness of Flange.

Dimensions in Inches and diameter.				Weight per foot run.	Safe Load in Tons Distributed for Clear Spans of					
A	B	C	D	lbs.	6ft.	10ft.	12ft.	16ft.	20ft.	30ft.
3	1½	.16	.248	4.0	0.92	0.55	0.46	—	—	—
3	3	.20	.332	8.5	2.0	1.2	1.0	—	—	—
4	1¾	.17	.24	5.0	1.5	0.91	0.76	—	—	—
4	3	.22	.336	9.5	3.1	1.9	1.6	—	—	—
4¼	1¾	.18	.325	6.5	2.4	1.4	1.2	—	—	—
5	3	.22	.376	11.0	4.5	2.7	2.3	1.7	—	—
5	4½	.29	.448	18.0	7.6	4.5	3.8	2.8	—	—
6	3	.26	.348	12.0	5.6	3.4	2.8	2.1	—	—
6	4½	.37	.431	20.0	9.6	5.8	4.8	3.6	—	—
6	5	.41	.520	25.0	12.0	7.3	6.0	4.5	—	—
7	4	.25	.387	16.0	9.4	5.6	4.7	3.5	2.8	—
8	4	.28	.402	18.0	11.0	7.0	5.8	4.3	3.5	—
8	5	.35	.575	28.0	18.0	11.0	9.0	7.0	5.5	—
8	6	.44	.597	35.0	23.0	14.0	11.0	8.6	7.0	—
9	4	.30	.460	21.0	15.0	9.0	7.5	5.6	4.5	
9	7	.55	.924	58.0	42.0	25.0	21.0	16.0	12.0	—
10	5	.36	.552	30.0	24.0	14.0	12.0	9.0	7.2	—
10	6	.40	.736	42.0	35.0	21.0	17.0	13.0	10.0	—
10	8	.60	.970	70.0	53.0	34.0	28.0	21.0	17.0	—
12	5	.35	.550	32.0	30.0	18.0	15.0	11.0	9.0	—
12	6	.40	.717	44.0	40.0	26.0	22.0	16.0	13.0	—
12	6	.50	.883	54.0	52.0	31.0	26.0	19.0	15.0	10.0
14	6	.40	.698	46.0	43.0	31.0	26.0	19.0	15.0	10.0
14	6	.50	.873	57.0	59.0	38.0	31.0	24.0	19.0	12.0
15	5	.42	.647	42.0	47.0	28.0	24.0	18.0	14.0	9.5
15	6	.50	.880	59.0	62.0	42.0	35.0	26.0	21.0	14.0
16	6	.55	.847	62.0	73.0	45.0	38.0	28.0	22.0	15.0
18	7	.55	.928	75.0	—	64.0	53.0	40.0	32.0	21.0
20	7½	.60	1.01	89.0	—	83.0	69.0	52.0	41.0	27.0
24	7½	.60	1.07	100.0	—	102.0	92.0	69.0	55.0	36.0

Span should not exceed 20 times the depth of single joist.

Example for reading above table :—10 x 8 joist, with thickness web .60 inch, flange .97, weighs 70 lb. per foot run. Safe distributed load for 10 feet span is 34 tons ; for 16 feet span, 21 tons. Calculated at quarter the breaking strain.

I ROLLED STEEL BEAMS AS STANCHIONS.

(Dorman, Long & Co.)

Safe Loads in tons for Lengths in feet.

Size. Inches.	Weight. per ft lbs.	Feet long. 6	8	10	12	14	16	18	20	22	24
24 x 7½	100	164	154	143	130	115	100	87	76	—	—
20 x 7½	89	146	138	129	118	105	92	80	70	—	—
10 x 8	70	118	113	108	101	94	86	78	70	62	56
18 x 7	75	122	115	106	96	84	73	63	—	—	—
9 x 7	58	96	92	86	79	72	64	56	50	—	—
16 x 6	62	98	89	79	67	57	48	—	—	—	—
15 x 6	59	94	86	77	67	57	48	—	—	—	—
14 x 6	57	91	84	76	66	56	48	—	—	—	—
12 x 6	54	87	80	73	64	55	47	—	—	—	—
14 x 6	46	73	67	60	52	44	37	—	—	—	—
12 x 6	44	70	65	59	51	44	38	—	—	—	—
10 x 6	42	68	63	57	51	44	38	32	—	—	—
8 x 6	35	56	52	47	41	35	30	—	—	—	—
15 x 5	42	62	54	44	36	—	—	—	—	—	—
12 x 5	39	59	52	43	35	—	—	—	—	—	—
10 x 5	35	53	47	40	33	27	—	—	—	—	—
12 x 5	32	48	42	35	28	—	—	—	—	—	—
10 x 5	30	45	40	34	28	23	—	—	—	—	—
8 x 5	28	43	39	33	28	23	—	—	—	—	—
6 x 5	25	38	34	30	25	20	—	—	—	—	—
6 x 4½	20	29	25	21	17	—	—	—	—	—	—
5 x 4½	18	27	24	20	16	—	—	—	—	—	—
9 x 4	21	29	23	18	—	—	—	—	—	—	—
8 x 4	18	25	20	15	—	—	—	—	—	—	—
7 x 4	16	22	18	14	—	—	—	—	—	—	—

Weight of Steel Girder Plates, per ft. run.

Width.	Thickness ¼in. lbs.	5-16in. lbs.	⅜in. lbs.	½in. lbs.	⅝in. lbs.	¾in. lbs.	⅞in. lbs.
8 inches	7	8⅞	10⅝	14	17¾	21	24¾
9 ,,	8	9¾	12	16	19¼	24	27¼
10 ,,	8¾	11	13½	17½	22	27	30¾
12 ,,	10½	13¼	16	20¾	25½	32	36¾
14 ,,	12¼	15¼	18	24½	30	36	42¼
15 ,,	13	16½	20	26	33	40	46
16 ,,	14	17¾	21⅛	28	35½	42	49½
18 ,,	16	19⅞	24	31	38½	48	54
20 ,,	17½	22	27	35	44	54	61½
24 ,,	21	26½	32	41½	51	64	72

SPIKES.

Weight of 1000 Spikes of different lengths.

	lbs.		lbs.
5in. long	190	8in. long	525
6in. long	262	9in. long	626
7in. long	375	10in. long	900

NAILS.

Number of Diamond Nails in a 7lbs. packet.
Different lengths and gauges.

In. Gauge.	Approx. Number.	In. Gauge.	Approx. Number.
1 x 16	7400	2½ x 11	910
1 x 15	5600	2½ x 10	700
1 x 14	5000	2½ x 9	560
1½ x 14	2300	2½ x 8	455
1½ x 12	1680	3 x 10	567
1½ x 11	1440	3 x 9	469
1¾ x 11	1000	3 x 8	420
2 x 14	1860	3 x 7	336
2 x 13	1710	3 x 6	273
2 x 12	1030	3½ x 8	308
2 x 11	1106	3½ x 7	280
2 x 10	840	4 x 7	245
2 x 9	700	4 x 6	210
2½ x 13	1400	5 x 5	147
2½ x 12	1050	6 x 4	91

HOOP IRON.

½-cwt. bundle contains

Wdth. Gge.	feet.	Wdth. Gge.	feet.
½ x 22	1075	1½ x 16	155
½ x 24	1350	1½ x 18	225
¾ x 20	570	1¾ x 14	130
⅞ x 19	425	1¾ x 17	173
1 x 11	340	2 x 14	107
1 x 20	426	2 x 16	124
1⅛ x 17	270	2¼ x 13	90
1⅛ x 18	300	2½ x 12	73
1¼ x 16	210	2½ x 16	107
1¼ x 18	268	3 x 12	59

BIRMINGHAM WIRE GAUGE.

Comparative Sizes.

No.	1	4	7	11	16	22	
	5-16	¼	3-16	⅛	1-16	1-32	gauges = of an inch.

CAST IRON

Exclusive of Patterns and Fixing, per cwt.

	£	s.	d.		£	s.	d.
Ornamental air and light ventilators from 2ft. x 6in. to 3ft. x 12in. under windows, &c., for lighting basements, &c., per lb. 2d. ..	..	..	..		0	18	8
Cast-iron egg-shaped sewers, 1¼in. thick ..	..	..	..		0	18	0
Ditto, cap to engine-house or factory chimney in four sections, to be bolted together ..	1	0	0	to	1	4	0
Hollow columns, with caps and bases ..	0	12	0	to	0	18	0
Water or gas pipes with flange or faucet ends, in small quantities, 3in., 4in. and 5in. dia...	0	12	0	to	0	15	0
Furnace bars, sewer gates, and area gratings .	0	14	0	to	0	16	0
Furnace doors and frames, complete	0	18	0	to	1	2	0
Cast-iron plates for floors, 3/16in. to 5/16in. .	0	12	0	to	0	16	0
Cast-iron curved girders, best iron	0	16	0	to	0	18	0
Ditto do. do. bolted ends	..	..	..		1	4	0
Roof or Bridge castings, viz., heads, shoes, coupling, &c.	1	0	0	to	1	5	0
Cast-iron steps and risers to geometrical steps, the riser ornamental, and the treads grooved	1	10	0	to	2	4	0
Ditto for N.S.W. Government, with parabolic steps, arbitrary buttons on treads, &c. ..	2	0	0	to	3	0	0

COLUMNS, BALUSTERS, BRACKETS.

Verandah columns, plain or ornamental, 7ft. to 9ft long, 3in. x 3¼in. diam., fixed, each ..	2	0	0	to	2	10	0
Ditto, 4in. x 4¾in. diam., 9ft. to 12ft. long do.	2	10	0	to	3	0	0
Brackets, ornamental, 21in. to 30in. sides ..	0	2	6	to	1	0	0
Balusters, ornamental, for staircases	0	3	6	to	0	9	0
Newels, ornamental, 4in. to 8in. diam. ..	0	10	0	to	1	15	0
Finials, from 2ft. to 7ft. high	1	0	0	to	3	16	0
Palisade or gate bars, average 4ft. high, from..	0	2	6	to	0	3	6
Dog bars to match, half price.							
Galvanizing cast-iron, extra, per cwt... ..	0	16	0	to	1	0	0

Shrinkage of Casting in a foot. Pipes, ⅛in. Zinc and lead per foot 5/16in. ; Copper, per foot, 3/16in. ; Tin, ¼in.
Girders and Beams ⅛in. in 15in. ; Brass, ⅛in. in 10in.

BALCONY PANELS, CRESTINGS, FRIEZES.

Per Lineal Foot—Fixed.

Balcony panels, rich pattern, fitted with wrought iron top rail and standards, fixed complete ..	..	6	0	to	9	0
Ditto, plain Gothic, or other patterns ..	..	5	0	to	7	0
Ditto, very richly ornamented	..	7	0	to	10	0
Cresting or ridging, various patterns	..	2	0	to	4	0
Window guards, from 18in. to 30in. high ..	..	5	0	to	7	0
Friezes for verandahs, balconies, &c.	..	1	3	to	3	0

CASTINGS FROM STOCK PATTERNS.

	£	s.	d.
Verandah column, fluted, with cap and base, 10ft. x 4½in., each	2	10	0
Ditto, reeded, with top for brackets, 10ft. x 4in. ..	2	0	0
Balcony Railing—			
Balcony railing, cast iron, 2ft. 9in. high, 14lb. to 16lb. per foot run, from .. .. 2/9 to	0	4	6
Wrought top rail, 1/3 per ft. ; Stays, 3/6 ; Gates, 15/– each.			
Cast iron ornamental brackets, 16in. x 20in., 3/– to 3/6 ; heavy, 18in. x 22in., each	0	3	9
Panelling Frieze—			
Cast iron frieze, 6in., 1/– ; 9in., 1/3 ; 11in., 1/8 ; 15in., 2/– foot run.			
Cast iron panelling, 8in., 1/6 ; 11in., per foot run	0	2	9
Cast iron Ventilators, 24in. x 9in., each	0	4	0
Finials, 18in. long, 5/– ; 2 ft., 7/6 ; 2ft. 6in., 10/– ; 3ft., each	0	12	6

Manufacturers' advt., page 51.

BAKER'S OVEN FITTINGS.

Measurements and Weights.

	Length. ft.	in.	Height. ft.	in.	Weight. cwt.	qrs.	lbs.
Peel Plate and Frame, overall ..	5	7	2	9			
Oven Door, inside	1	11½	1	3½	5	0	15
Furnace Door and Frame, outside	1	10	1	7¾			
Furnace Door, inside	1	1½	1	0½			
Ash Pit Frame, outside	1	10	2	1	1	2	0
Ash Pit Door, inside	1	1¾	1	8			
2 Bearing Bars and 12 Furnace Bars	2	6	——		2	0	4
1 Steam Damper, inside measurement, 9in. x 11¾in. ..					0	0	26
					8	3	17

	£	s.	d.
No. 1 Set—Complete Set, as above	£15	0	0
No. 2 Set—Complete Set, as above, but with the length of the Peel Plate 6in. shorter	14	0	0

Tie Rods and Plates size to order extra.

Size.	Weight. cwt.	qrs.	lbs.
Oven door, 18½in. wide x 12in. high, and Frame, 24¾in. wide, 15¾in. high	–	2	10
Peel Plate, 46in. at front, tapering to 25in. at back x 18in. deep	–	2	18
8 Furnace—8 Bars, 2ft. 6in. long, and 2 Bearers	1	2	10
2 Dampers and Frames, 10in. x 12in., with 4 W. Iron Rods, 18in. long x ⅝in., with nuts	–	1	0
Furnace and Ash Pit Frame overall, 18in. wide x 45in. high	1	0	11
	4	0	21

Furnace Opening, inside, 12in. x 12in. Ash Pit Opening, inside, 12in. x 23½in. high.

	£	s.	d.
No. 3 Set, as above, price	£6	10	0
Bakers' Ovens Pyrometers, each	5	5	0
,, Oven Lights	8	8	0

For further information *see* advt. page 2.

Weight per foot run of Round and Square Cast Iron Bars.

Ins. Diam. Round.	lbs.	Size of Scantling Square.	lbs.	Ins. Diam. Round.	lbs.	Size of Scantling Square.	lbs.
		In. sq.				In. sq.	
$\frac{1}{4}$	0.15	$\frac{1}{4}$	0.20	$2\frac{1}{2}$	15.34	$2\frac{1}{2}$	19.53
$\frac{3}{8}$	0.24	$\frac{3}{8}$	0.46	$2\frac{5}{8}$	16.11	$2\frac{5}{8}$	21.53
$\frac{1}{2}$	0.61	$\frac{1}{2}$	0.78	$2\frac{3}{4}$	17.56	$2\frac{3}{4}$	23.63
$\frac{5}{8}$	0.96	$\frac{5}{8}$	1.22	$2\frac{7}{8}$	20.29	$2\frac{7}{8}$	25.83
$\frac{3}{4}$	1.38	$\frac{3}{4}$	1.75	3	22.09	3	28.12
$\frac{7}{8}$	1.88	$\frac{7}{8}$	2.39	$3\frac{1}{4}$	25.92	$3\frac{1}{4}$	33.00
1	2.45	1	3.12	$3\frac{1}{2}$	30.06	$3\frac{1}{2}$	38.28
$1\frac{1}{8}$	3.50	$1\frac{1}{8}$	3.95	$3\frac{3}{4}$	34.52	$3\frac{3}{4}$	43.94
$1\frac{1}{4}$	3.85	$1\frac{1}{4}$	4.88	4	39.27	4	50.10
$1\frac{3}{8}$	4.64	$1\frac{3}{8}$	5.90	$4\frac{1}{4}$	44.33	$4\frac{1}{4}$	56.44
$1\frac{1}{2}$	5.52	$1\frac{1}{2}$	7.03	$4\frac{1}{2}$	49.60	$4\frac{1}{2}$	63.28
$1\frac{5}{8}$	6.49	$1\frac{5}{8}$	8.25	$4\frac{3}{4}$	53.37	$4\frac{3}{4}$	70.50
$1\frac{3}{4}$	7.52	$1\frac{3}{4}$	9.37	5	61.36	5	78.12
$1\frac{7}{8}$	8.62	$1\frac{7}{8}$	10.98	$5\frac{1}{2}$	74.19	$5\frac{1}{4}$	86.13
2	9.71	2	12.50	6	88·35	$5\frac{1}{2}$	94.53
$2\frac{1}{8}$	11.08	$2\frac{1}{8}$	14.11	$6\frac{1}{2}$	100.70	$5\frac{3}{4}$	103.32
$2\frac{1}{4}$	12.40	$2\frac{1}{4}$	15.80	7	120.26	6	112.50
$2\frac{3}{8}$	13.84	$2\frac{3}{8}$	17.2	12	353.42	12	450.00

Table showing the Approximate Weight a Round Column of Solid Cast Iron will bear safely at stated lengths, at from 6 feet to 24 feet height of Column.

Dia.	6ft.	8ft.	10ft.	12ft.	14ft.	16ft.	18ft.	20ft.	22ft.	24ft.
in.	t. ct.	t. ct.	t. ct.	t. ct.	t. ct.	t. ct.	t. ct.	t. ct.	t. ct.	t. ct.
$2\frac{1}{2}$	5 5	4 15	4 5	3 15	3 5	2 15	2 5	1 15	1 5	0 15
3	8 0	7 7	6 14	6 1	5 8	4 15	4 2	3 9	2 16	2 3
$3\frac{1}{2}$	11 5	10 5	9 5	8 5	7 5	6 5	5 5	4 5	3 5	2 5
4	15 0	13 19	12 18	11 17	10 16	9 15	8 14	7 13	6 12	5 11
$4\frac{1}{2}$	19 5	18 4	17 3	16 2	15 1	14 0	12 19	11 18	10 17	9 16
5	24 0	22 15	21 10	20 5	19 0	17 15	16 10	15 5	14 0	12 15
6	35 0	33 15	32 10	31 5	30 0	28 15	27 10	26 5	25 0	23 15
7	48 0	46 15	45 10	43 5	42 0	4 15	39 10	38 5	37 0	35 15
8	63 0	61 0	59 0	57 0	55 0	53 0	51 0	49 0	47 0	45 0
9	80 0	78 0	76 0	74 0	72 0	70 0	68 0	66 0	64 4	62 0
10	99 0	97 0	95 0	93 0	91 0	89 0	87 0	85 0	83 0	81 0
11	120 0	118 0	116 0	114 0	112 0	110 0	108 0	106 0	104 0	102 0
12	143 0	141 0	139 0	137 0	135 0	133 0	131 0	129 0	127 0	125 0

RULE.—Square the diameter of column and the result of superficial inches, less 1, is the safe sustaining weight in tons at 6 feet high, less proportionately every 2 feet as per table

The Weight per Foot Super of Cast or Wrought Iron.

Thickness	Cast Iron.	Wrought Iron.	Thickness.	Cast Iron.	Wrought. Iron.
Inch.	lbs.	lbs.	Inch.	lbs.	lbs.
1-16	2.35	2.52	$\frac{5}{8}$	23.44	25.20
$\frac{1}{8}$	4.09	5.04	$\frac{3}{4}$	28.12	30.24
$\frac{1}{4}$	9.39	10.08	$\frac{7}{8}$	32.81	35.28
$\frac{3}{8}$	14.06	15.12	1	37.50	40.32
$\frac{1}{2}$	18.75	20.16			

Table showing the Approximate Weight that Given Diameter and Thickness of Metal in Hollow Cast Iron Columns will support.

The following dimensions are calculated for 10 feet columns, but may be safely adopted up to 12 feet long.

Outside diameter of column. inches.	Thickness of metal inches.	Weight supported tons	cwts.	Outside diameter of column inches.	Thickness of metal inches.	Weight supported tons	cwts.
3	$\frac{1}{2}$	3	0	8	$\frac{3}{4}$	18	10
	$\frac{3}{4}$	4	10		1	23	15
	1	6	0		$1\frac{1}{4}$	27	10
$3\frac{1}{2}$	$\frac{1}{2}$	3	15	9	$\frac{3}{4}$	22	10
	$\frac{3}{4}$	6	0		1	26	10
	1	7	15		$1\frac{1}{4}$	35	0
4	$\frac{1}{2}$	4	5	10	1	27	10
	$\frac{3}{4}$	7	0		$1\frac{1}{2}$	51	0
	1	9	10	11	1	32	10
$4\frac{1}{2}$	$\frac{1}{2}$	6	0		$1\frac{1}{2}$	55	0
	$\frac{3}{4}$	8	15	12	1	38	0
	1	11	5		$1\frac{1}{2}$	62	10
5	$\frac{1}{2}$	6	10	13	1	47	10
	$\frac{3}{4}$	9	15		$1\frac{1}{2}$	70	0
	1	13	0	14	1	52	10
$5\frac{1}{2}$	$\frac{1}{2}$	7	0		$1\frac{1}{2}$	78	0
	$\frac{3}{4}$	11	5	15	1	56	10
	1	15	10		$1\frac{1}{2}$	85	0
6	$\frac{1}{2}$	8	10	16	1	61	0
	$\frac{3}{4}$	13	0		$1\frac{1}{2}$	90	0
	1	17	10	17	1	65	10
$6\frac{1}{2}$	$\frac{1}{2}$	9	10		$1\frac{1}{2}$	95	0
	$\frac{3}{4}$	14	15	18	1	72	0
	1	20	0		$1\frac{1}{2}$	100	0
7	$\frac{1}{2}$	10	5				
	$\frac{3}{4}$	16	0				
	1	21	10				

Weight of Cast Iron Pipes.

Note.—The inch pipes are 3½ feet long, the 1½ inch 4½ feet long, the 2 and 2½ inch are 6 feet long, and the other sizes 9 feet long.

Bore.	Thick.	Weight.	Bore.	Thick.	Weight.	Bore.	Thick.	Weight.
In.	In.	cwt. qrs. lbs.	In.	In.	cwt. qrs. lbs.	In.	In.	cwt. qrs. lbs.
1	¼	0 0 12	5½	½	2 2 0	12	¾	7 3 20
	⅜	0 0 21		⅝	3 0 18		1	10 3 0
1½	¼	0 0 21		¾	3 3 7	13	¾	8 2 7
	⅜	0 1 4	6	½	2 2 21		1	11 2 12
2	¼	0 1 8		⅝	3 1 17	14	⅝	7 2 16
	⅝	0 2 0		¾	4 0 16		¾	9 1 0
2½	⅜	0 2 10		1	5 2 20		1	12 1 14
	½	0 3 10	7	½	3 0 7	15	⅝	9 3 7
3	⅜	1 0 6		⅝	3 3 20		1	13 0 26
	½	1 1 12		¾	4 3 5		1¼	10 3 5
	⅝	1 3 6		1	6 2 4	16	¾	10 1 20
3½	⅜	1 0 21	8	⅝	4 1 25		1	14 0 8
	½	1 2 14		¾	5 1 18		1¼	17 3 14
	⅝	2 0 8		1	7 1 16	18	1	15 2 24
4	½	1 3 12	9	⅝	5 0 4		1⅛	17 2 26
	⅝	2 1 12		¾	6 0 2		1¼	20 0 2
	¾	2 3 21		1	8 0 26	20	1	17 1 15
4½	½	2 0 4	10	⅝	5 4 26		1¼	21 3 24
	⅝	2 2 14		¾	6 2 14	22	1	18 3 18
	¾	3 0 21		1	9 0 8		1¼	24 0 23
5	½	2 1 10	11	⅝	6 0 11	24	1	20 3 5
	⅝	2 3 17		¾	7 1 7		1⅛	23 2 4
	¾	3 1 14		1	9 3 20		1¼	26 1 10

Jointing Pipes.—Lead and gasket or fine hemp rope and labour, for joints of socket pipes :—

Pipe—Diam. inter. .	Inches. 4	6	9	12	15	18	24	30	36	42	48
Lead, lbs. per joint	6	9	14	21	29	38	48	59	70	82	94
Gasket, pence ,,	4	6	8	10	12	15	18	21	24	27	30
Labour, pence ,,	10	15	20	26	37	45	60	75	90	105	120

Two rings or coils of gasket are generally used, about 1½in. wide together. Keep the pipes dry and the mouth of the clay ring oiled to prevent the explosive effect of the steam generated by the sudden contact with the melted lead. Clay only can be used for pipes up to 18in. diam., a leather strap or rope will hold the clay for 24in. pipes; above this size use iron collars or straps in semi-circles screwed together with bolts at bottom and top, these fit closely to the required joint and are lightly covered with clay. The large pipes can be run with one melting of lead, if heated to a blue tinge; after the joint is run it is caulked.

The cost of laying the pipes up to 9in. diam. would be about 20 per cent. more than for earthenware pipes (*see* Drainer), above this size as follows :—

Labour.—Making joints of 4ft. diam. cast iron water main pipe—Lead, $2\frac{1}{2} \times \frac{1}{2} = 150$lbs. lead.

Preparing single joint, melting lead, &c., two men, one day, 20/–. For a number of joints reckon 8/– to 10/– each.

Labour in carting one mile, lowering and levelling pipes and adjusting for joints :—

Diam. inches	12	15	18	24	30	36	42	48
Cost per lineal foot ..	1/8	2/4	3/–	3/6	4/2	4/8	5/4	6/–

The cost of excavation in hard clay or light shale to a depth of three feet including recesses for jointing, refilling 9in. layers, watering and ramming per lineal foot, will be about 50 per cent. more than last item for lowering, laying, &c.

Flange pipes are jointed with a collar of 3 or 4lb. lead, bedded in soft red lead putty and screwed together with bolts, 3 to 6in. apart.

Ends of Pipes.—The two flanges of a flange pipe, or the faucet end of a socket pipe, are equal in weight to from 8 to 11in. of the pipe.

WEIGHT OF A LINEAL FOOT OF CAST-IRON PIPES IN LBS.

Bore inches.	Thickness of Metal.	Weight lbs.	Bore inches.	Thickness of Metal.	Weight lbs.	Bore inches.	Thickness of Metal.	Weight lbs.
3	$\frac{3}{8}$	12·4	11	$\frac{1}{2}$	56·4	22	$1\frac{1}{8}$	254·9
	$\frac{1}{2}$	17·1		$\frac{5}{8}$	71·0		$1\frac{1}{4}$	284·8
	$\frac{5}{8}$	22·2		$\frac{3}{4}$	86·4	24	1	245·0
4	$\frac{3}{8}$	16·1		$\frac{7}{8}$	101·8		$1\frac{1}{8}$	276·9
	$\frac{1}{2}$	22·1	12	$\frac{5}{8}$	77·3		$1\frac{1}{4}$	319·3
	$\frac{5}{8}$	28·3		$\frac{3}{4}$	93·7	27	1	276·0
5	$\frac{3}{8}$	19·8		$\frac{7}{8}$	110·4		$1\frac{1}{8}$	311·0
	$\frac{1}{2}$	26·9	1		127·4		$1\frac{1}{4}$	348·0
	$\frac{5}{8}$	34·4	14	$\frac{5}{8}$	89·6		$1\frac{3}{8}$	384·0
6	$\frac{3}{8}$	23·4		$\frac{3}{4}$	108·4	30	1	305·0
	$\frac{1}{2}$	31·9		$\frac{7}{8}$	127·5		$1\frac{1}{8}$	345·0
	$\frac{5}{8}$	40·6	1		147·0		$1\frac{1}{4}$	384·0
	$\frac{3}{4}$	49·7	15	$\frac{3}{4}$	115·7		$1\frac{3}{8}$	424·0
7	$\frac{3}{8}$	27·1		$\frac{7}{8}$	136·1	33	1	335·0
	$\frac{1}{2}$	36·8	1		156·8		$1\frac{1}{8}$	378·0
	$\frac{5}{8}$	46·7		$1\frac{1}{8}$	177·7		$1\frac{1}{4}$	421·0
	$\frac{3}{4}$	56·8	16	$\frac{3}{4}$	123·1		$1\frac{3}{8}$	465·0
8	$\frac{3}{8}$	30·8		$\frac{7}{8}$	144·7	36	$1\frac{1}{8}$	411·0
	$\frac{1}{2}$	41·6	1		166·6		$1\frac{1}{4}$	458·0
	$\frac{5}{8}$	52·8		$1\frac{1}{8}$	188·7		$1\frac{3}{8}$	506·0
	$\frac{3}{4}$	64·3	18	$\frac{3}{4}$	137·9		$1\frac{1}{2}$	554·0
9	$\frac{3}{8}$	34·4		$\frac{7}{8}$	161·8	42	$1\frac{1}{8}$	478·0
	$\frac{1}{2}$	46·6	1		186·2		$1\frac{1}{4}$	532·0
	$\frac{5}{8}$	58·9		$1\frac{1}{8}$	210·8		$1\frac{3}{8}$	588·0
	$\frac{3}{4}$	71·7	20	$\frac{7}{8}$	178·9		$1\frac{1}{2}$	644·0
10	$\frac{1}{2}$	51·4		1	205·8	48	$1\frac{1}{8}$	544·0
	$\frac{5}{8}$	65·1		$1\frac{1}{8}$	232·9		$1\frac{1}{4}$	605·0
	$\frac{3}{4}$	79·0		$1\frac{1}{4}$	260·3		$1\frac{3}{8}$	669·0
	$\frac{7}{8}$	93·3	22	1	225·4		$1\frac{1}{2}$	733·0

MASONRY.

In estimating the cost of **cubed** or **dimension stone** at per *cubic foot*, first take the average size of the stones required, and the cost of such stones delivered on the work. Take next the number of superficial feet of face-work on the stone, then the number of feet super. of dressed beds and joints in the same stone, add the cost of setting the stone, and you cannot fail to arrive at a correct estimate of the net cost and description of masonry, to which add profit according to the total cost of the work and the time required to finish it.

The different portions of masonry should also be classed as follows, if estimating at per cubic foot :—

One-face work, as ashlaring, or common face-work, base courses, plinths, friezes, &c.

Two-face work, as quoins, imposts, architraves, parapets, &c.

Three-face work, as copings, strings, cornices, pilasters, &c.

Four or more face work, as newels and caps, to ditto, blocks to cornices, chimney caps, &c. By such means the defective system of estimating may be pruned of much of its uncertainty ; the proper, because the most correct method, being to estimate the rough stone at per cubic foot, and the labour in dressing at per foot super.

Tooled margins, if round rock or quarry face, which is not measured, to be taken by the foot super, at double their width.

Raised work to be measured as *flat* work, the margins being taken as sunk work.

Masonry and stonecutting.—The remarks under these headings will include every description of stonework. The setting or fixing and mortar is generally added to the cost of stone at per cube foot. All metal work, such as joggles, cramps, bolts, &c., or running in lead or sulphur is reckoned by the pound.

N.S.W. Masons' Wages Award, May 21st, June 3rd, 1913 :—

	Per hour. s. d.
Stone Machinist and Stone Setters, 48 hours per week	1 8
Stone Cutters and Trachyte Masons, 44 hours per week	1 8
Rubble Masons and Kerb and Gutter, 44 hours per week	1 7
Rubble and Stone Mason Labourers, 48 hours per week	1 3 to 1 6

Labour—Piecework Log for Rubble.

In walls up to 18in. thick, 16ft. 6in. run by 1ft. high counts as 1 perch, and in thicker walls 25ft. cube counts as 1 perch. 1/6 extra per perch has to be paid for each additional 5ft. in height.

Agreements for piecework, or labour-only contracts, must be in writing, and if the contract is for more than one class of work, each class must be measured and priced separately.

Piecework is not allowed for stone-cutters or setters, machinists, or kerb and gutter masons.

All stone must be delivered within 16ft. of the building line, or some arrangement (presumably extra payment) expressly agreed to by the employee.

Random Rubble Uncoursed (Hammer Dressed).

Price per perch 4/9, over 5ft. high, 1/6 extra; if finished inside for white wash plaster, &c., 9d. extra.

Random Rubble Built in Courses.

Price per perch 5/6, over 5ft. high, 1/6 extra; if finished inside for plaster, &c., 9d. extra.

Squared Rubble Uncoursed, or in Courses.

Price per perch 11/–, over 5ft. high, 1/6 extra; if finished inside for plaster, &c., 9d. extra.

Coursed Rubble.

Courses may be up to 13in. high; price per perch 10/3, over 5ft. high 1/6 extra; and if finished inside for plaster, &c., 9d. extra.

The following prices apply to Sydney, Parramatta, and Hobart for freestone, and Melbourne for bluestone, and include delivery within two miles of the quarry at these places:—

FOUNDATIONS AND DIMENSION STONES.

Scappled Stone at different Australian quarries.

Wages, 1/8 per hour.

	Freestone.		Bluestone.	
	s.	d.	s.	d.
Footings in 12in. through stones, per perch of 25 cubic feet	17	0	18	0
Parapet, scappled on both sides, per perch, 25 cubic ft.	25	0	26	0
9in. ashlar, 33 lin. ft., per perch	17	0	17	0
Rubble, per perch, of 25 cubic feet	3	6	5	6
Lintels, steps or sills (12 x 6), at per lin. ft.	1	0	1	3
Cartage, per perch, rubble	3	0	5	0

DIMENSION STONES.

Dimensions, stones, from 6 to 12 cubic ft., per cubic ft.	1	6	1	9
Ditto, 12 to 24 cubic feet	1	9	2	3
Ditto, 24 to 36 cubic feet	2	0	2	6
Ditto, 36 to 48 cubic feet	2	6	2	9
Ditto, 48 to 60 cubic feet	3	0	3	9
Flag stones, rough, 4 inches	1	0	2	0

If more than 4ft. deep on natural bed one-third more than these prices.

CURBS, GUTTERS, CUBES.

Cubes or paving stones, 4 x 9 x 12 or 15in., per sup. yard	4	6	8	0
9in. piethers, 9 x 9 x 9, per super. yard	4	0	7	0
Curbs, for footpaths, c., 13 x 6, p.l.f.	0	9	1	0
Ditto, 18 x 8	1	0	1	4

GRINDSTONES.

Grindstones, 6in. wide:—2ft. dia., 10/–; 2ft. 6in., 14/–; 3ft., 25/–; 3ft. 6in., 35/–; 4ft., 60/–; 4ft. 6in., 80/–.

Ditto, 10in. wide:—3ft. dia., 35/–; 3ft. 6in., 47/–; 4ft. 75/–; 4ft. 6in., 100/–.

VARIOUS BUILDING STONES (Scappled).

Delivered in Melbourne, per cube foot.

	s.	d.
Spring Bay (Hobart Town) free sandstone, up to 15 cubic feet	5	0
Waurn Ponds (Geelong), free limestone, any size	2	4
Oamaru (New Zealand) do. up to 30 cubic feet	3	6
Ditto do. up to 60 cubic feet	3	10
Sydney free sandstone, up to 30 cubic feet	3	10
Ditto do. up to 60 cubic feet	4	6
Stawell sandstone	3	10

Scappled Stone at Melbourne, per cubic foot.

	£	s.	d.
Kapunda (S. Australia), marble	0	4	6
Gabo Island red granite for columns	1	0	0
Harcourt grey granite (Mt. Alexander)	0	4	3
Barrabool Hills (Geelong), free sandstone, in blocks	0	2	4
Wallunga Slate (S. Australia, Port Pirie) at Adelaide	0	4	0
Tarlee Stone at Adelaide	0	2	4

Scappled Stone at Quarry, per cube foot.

	Quarry. s.	d.	Sydney. s.	d.
Moruya (N.S.W.) grey granite	5	0	9	0
Bluestone (Malmsbury, Vic.), up to 10 cubic feet	3	9	5	6
Ditto do. 15 ,,	4	0	6	0
Ditto do. 20 ,,	4	6	7	0
Ditto do. 30 ,,	5	6	8	0
Ditto do. 40 ,,	6	6	9	0
Port Chalmers Stone, about two-thirds the prices given for bluestone				
Portland (N.S.W.) Limestone, at quarry	1	6		
Cooma do., grey soft granite, at the quarries	2	0		

Scappled Stone, &c., in Launceston.

	s.	d.
Sandstone, per cubic foot	4	0
Window sills, 12 x 6, per lin. ft.	4	0
Primary grey stone, for rough curbing foundations, &c., per cube yard	6	0

Bluestone is obtained at Piper's Creek, on the Tamar River, 20 miles from Launceston.

Scappled Stone, &c., at Hobart.

Ti-tree freestone up to 14 cubic feet delivered at Railway Station, per cube foot	3	6	
Knocklofty brown freestone in general use, or from O'Brien's Bridge and Glenorchy	2	6 to 3	9
Knocklofty rubble stone, per 1 horse load	9	0	
Flagging, from Risden's, per super ft.	1	0	

Gate Cap.—An octagon pointed or pyramidal gate cap in Sydney freestone, about 22in. by 22in. by 30in. high, took a stone-cutter 48 hours to dress it, or at the rate of 6 hours per cube foot; this at 1/6 per hour = 9/- per cube foot for labour only without *sharps* or profit.

Curved pediment in Sydney freestone, with cornice under; size of stone, 6ft. 8in. x 2ft. 4in. x 2ft. = 31 cubic feet.

	£	s.	d.
Beds and joints, 25ft. x 2ft. = 50 super. feet at 4d... ..	0	17	0
Rubbed curved face, 3ft. x 1ft. = 3 super. feet at 1/4 ..	0	4	0
Ditto curved and moulded, largest girt, 30 super feet at 3/4	5	0	0
Banking and superintendence	0	10	0
4/3 per cubic foot for labour only = ..	6	11	0
All materials add 31 cubic feet stone at 1/6	2	6	6
Setting and cement mortar, 31 cubic feet at 1/- ..	1	11	0
	10	8	6

31 cubic feet = 6/9 per cubic foot cost price.

Galvanised iron cramps and bond irons about $2\frac{1}{2}$ x $\frac{1}{4}$, used in Government buildings in Sydney, equal to about 1lb. to 5 cubic feet of masonry.

SANDSTONE QUARRIED AND DRESSED.

Pyrmont Stone.	Per foot. s.	d.
Window sills, 12 x 6, weathered and throated, 3ft. to 7ft. daylight	3	0
Ditto, sunk, weathered and throated	3	6
Ditto, larger sills, per cubic foot	3	6
Steps, 12 x 6, tread and riser, dressed, bedded and jointed..	2	6
Copings and plain, 10 x 12, one clean face, and cham., from..	3	0
Ditto, splayed and throated, 12 x 6, two clean faces and cham., from	3	6
Round Top, 12 x 3, for steps and garden coping	1	6
Kerb and Guttering, 12 and 18 x 9, sawn faced	2	8
Building Rubble, Sydney and suburban quarries, per perch ($16\frac{1}{2}$ft.)	3	6
Squared Rubble, ditto, per perch ($16\frac{1}{2}$ft.)	6	0
Base Course, 12 x 12, per cubic foot	1	0

Footings and Rubble.

Materials within 2 miles, per perch of 25 cubic feet.

	Sydney Sandstone. £ s. d.	Melbourne. Bluestone. £ s. d.
18in. x 12in. footings, from 2 to 3ft. long, quarry dressed, except beds which are rough axed	1 15 0	1 17 6
Larger footings, quarry faces, with clean-axed or chiselled beds and joints	2 5 0	2 15 0
Hammer squared course rubble, with 3 through stones, per perch	0 16 6	1 0 0
Random rubble in walls or abutments, with 3 through stones, inside and outside walls..	0 15 6	0 17 0
Ashlar pitched, quarry faced; axed beds and joints and 3 through stones	1 17 6	2 10 0
Outside	19 0	
Inside Walls	14 0	

ASHLAR AND BUTTRESSES.

Materials within 2 miles.

	Sydney Sandstone. £ s. d.	Melbourne Bluestone. £ s. d.
Ashlar church, warehouse, or school walls, neat axe and draft both sides, and with axed beds and joints, per perch	2 5 0	4 5 0
12in. parapet walls, ditto	2 10 0	4 10 0
Ditto rough for plastering	1 15 0	3 0 0
Ashlar axe and draft outside and scappled inside for plastering, axed beds and joints ..	2 0 0	2 17 0
Buttresses cube stones, dressed 3 sides ..	3 5 0	5 10 0
If more than 10ft. high, add for each 10ft. in height	0 2 6	0 2 8
Underpinning Ashlar Wall in 12in. courses, 2 courses taken out and filled up with brick in cement, secured at top with iron wedges, wall 2ft. 6in. thick, per lin. ft.	1 5 0	1 15 0

N.B.—Brisbane and Mount Somers sandstone same as at Sydney.

CULVERTS AND TUNNELS.

All Materials.	£ s. d.
18in. square hammer dressed, with true beds and joints (sandstone handy), per lin. yard	1 10 0
24in. square ditto ditto do.	2 0 0
5 to 10ft. culverts with rough radiating joints, including the ends or faces of culverts, per cubic yard	3 0 0
18in. radiated masonry to tunnels, all through stones, curved, picked face and boastered joints per cubic yard in sandstone	4 0 0

STONE SETTING.

	Sydney Sandstone.	Spring Bay Sandstone.	Oamaru Freestone.
	s. d.	s. d.	s. d.
Balusters, either round or square, if 4in. largest diam., or side, and 12in. high	9 0	11 6	5 0
Ditto, if 4in. diam., or side, and 18in. high	10 0	12 6	5 3
Ditto, 8in. do. and 24in. high	11 0	14 0	6 0

Brisbane sandstone same as Sydney sandstone. Average cost of architrave jamb, 10ft. x 2ft. x 1ft., front and reveal rubbed, including mouldings, 21in. girt, reveal bevelled, side checked, all other faces clean chiselled, *cost* 4/3 *per cube foot, labour only*, in Sydney sandstone, exclusive of setting, mortar, cramps, stone, &c.

Proportionate cost of sunk and circular work.—Sunk work, 3in. deep, one-fourth more than similar straight work.

Sunk work, 6in. deep, one-half more.

Circular work, from one-third to one-half more than similar straight work.

Circular-circular or spherical, from two to four times, according to sharpness of curve.

SETTING CUBE STONES.

Labour and Mortar, per foot cube.	s. d.
Setting ashlar facing, 4½in. to 14in. on bed and less than 1½ c. ft.	0 8
Setting freestone, bluestone, or granite in blocks not more than 3 cubic feet, including scaffolding, haulage, cramps, lewis and grooves	0 6
Ditto, if carved or moulded, do.	0 7
Ditto, block from 2ft. to 6ft. long, do.	0 8
Ditto, do. if moulded or carved above 6ft. long ..	1 0
Dressing and setting Footings, per perch	7 6
Ditto. do. Rubble in walls, per perch .. 6 0 to 9	0

For every 10ft. in height above 40ft., add one-fourth the above rates. One lb. cramps will do from 5ft. to 10ft. of masonry.

CARTAGE.

Carting bluestone, granite, or sandstone, one mile, per ton. (*See* "Weight of Materials")	2 6
Add for each mile beyond, per ton	0 9
Carting rubble, per perch (measured in wall), one mile .. 3 0 to 4	0
Add for each additional mile .. .. .. 0 9 to 1	0

EXAMPLES OF ESTIMATING.

Stone Cornice (Sydney freestone) on 14in. brick wall.

	s. d.
Stone delivered 2.0 x 1.0 = 2 cube feet at 1/3	2 6
Setting and mortar, 2 cubic feet at 9d.	1 6
Mouldings, 24in. girt, cut and rubbed, 2 sup. ft. at 2/6 ..	5 0
Weathering, chiselled and rubbed, 1 sup. foot	1 3
Beds and joints, about 3 sup. ft. at 4d.	1 0
Per lineal foot	11 3

Or 5/7½ per cube foot = cost price.

TRACHYTE.

Delivered on Rail or Steamer, Sydney.

Delivered on Rail or Steamer, from Bowral, N.S.W., Quarries.

	£	s.	d.
Footings an cube stones, quarry dressed, to 20 c. ft. ; per c. ft. (*Large blocks as per arrangement.*)	0	4	0
Rough Slabs for Coring, 3in. thick, per sq. ft.	0	2	3
Ditto do. 9in. thick, per sq. ft.	0	3	6
Kerbing, 12in. x 18in., sawn face and edge, chamfered, square jointed, per lineal ft.	0	5	0
Guttering, 18 x 6 do. do. do. ..	0	4	0
Paving Cubes, 7in. x 4in. x 9in., for cartways, per 100. .	1	10	0
Flagging, sawn and squared, 3in. thick, per sq. ft. ..	0	2	6
Landings, up to 6in. x 20 sq. ft.	0	5	0

STEPS, SILLS, &c.

	s.	d.
Steps, 12 x 6, sawn tread and riser, per sq. ft.	5	6
Window sills, 12 x 6, weathered and throated, per sq. ft. ..	6	0
Girder Bearers, Corbels, and other dimensions stones, per cub. ft.	4	0
Polishing flat surfaces, exclusive of axing, per sq. ft.	6	6
Red and Grey Granite, in the rough, per cubic ft.	8	0
Gal. Iron Joint Cramps, 1 x ½, including cutting groove, set in cement, per inch run	0	1½
Ditto, run in lead	0	2
Copper Pipe, for dowels, per foot run—¾in., 1/– ; 1in. ..	1	6

Labour on Trachyte, reckon 3 times for Sandstone.
Labour on Granite.—*See* page 59.

GRANITE (HARCOURT).

	s.	d.
On rail or wharf, Melbourne, per cube foot, up to 8ft. long—		
Dimension stones, under 35 cube feet, each	3	6
Dimension stones, under 50 cube feet, each	3	11
Dimension stones, under 60 cube feet, each	4	4
Dimension stones, under 80 cube feet, each	5	0

Extra large stones.—If the stones for cornice exceed 20 cubic feet each, add one-fifth extra to the dressing, on account of the difficulty in handling or turning the stone while being worked ; but if most of the stones in the building, viaduct, &c., are of a large size, and the tackle is sufficient to move them easily, it will be found cheaper to dress, hoist, and set large than small stones, because the beds and joints, and the time required for hoisting and setting, are less in proportion to the cubic contents of the former as compared with the latter. This remark applies to steam cranes on oregon tripod pedestal, the cost of which is given under the head of Electrical, or to common cranes now mostly used. *See* PLANT AND TOOLS.

BLUESTONE.

Quarry prices, Melbourne.

	s.	d.
Bluestone Rubble, 13in. x 6in., per run. foot	0	8
,, dressed, extra	0	6
,, undressed, per cubic foot	1	9
Bluestone rough axed beds and joints, up to 4ft. x 2ft. x 2ft., per super. foot	0	6
,, patent axed faces, do. do.	2	6
,, **Window Sills,** 6½in. deep, patent axed faces, under 5ft. long, up to 18in. wide, per super. foot.	4	3
Window Sills, from 5ft. and under 6ft.	4	6
Ditto. from 6ft. and under 7ft.	5	0
Door Steps, 6½in. deep, patent axed tread and risers, under 5ft. long, up to 18in. wide	4	0
Do. do. from 5ft. and under 6ft.	4	3
Ditto do. from 6ft. and under 7ft.	4	9

FLAGGING.

Thickness.	1in.	1½in.	2in.	2½in.	3in.
	s. d.	s. d.	s. d.	s. d.	s. d.
Flagging, sawn and sqrd., per sup. ft.	1 0	1 1½	1 2	1 3	1 4

If enamelled slates, 1/6 per foot extra, measured on all faces.

LANDINGS.

Thickness	4in.	5in.	6in.	7in.	8in.
	s. d.	s. d.	s. d.	s. d.	s. d.
Landings, sawn and sqrd., up to 12c.ft.	1 9	2 3	3 6	3 10	4 0
Bluestone, 12 to 18 cubic feet ..	—	—	3 10	4 2	4 6
Ditto 18 to 28 do. ..	—	—	5 0	5 4	5 8

LABOUR ONLY, LAYING.

Per yard super. in Melbourne.

	s.	d.
Channelling, with 7in. Bluestone pitchers in sand	0	10
Cube Pitching, with 4 x 9 pitchers, in sand	1	3
Bluestone curbing, 18 x 6, rough axed and laid p.l.y. ..	5	0
Ditto Circular ditto ditto .. .. .. - 6	0 to	9 0
Laying 2in. to 3in. sqrd. flagging, jointed in mortar, per sup. yd.	1	0
Labour Laying Cubes.—On prepared bed, grouted with cement, per sup. yards	2	0

Pitchers, per 100 at quarries—3in. to 5in. deep, 9in. wide, 10in. to 14in. long, 18/6; 9in. deep, 9in. wide, 10in. to 12in. long, 30/–.

Cubes—4in. x 5in., 8in. to 10in. long, 12/6; 5in. to 6in. wide, 8in. to 9in. deep, 10in. to 14in. long, 27/6.

Rubble, 2½d. sup. ft. Pitcher kerb, 6 x 9, 4d. ft.

SAWING AND POLISHING, *Per foot super., each face.*

Sawing Oamaru (New Zealand) or Geelong freestone	0	5
Sawing Sydney or Spring Bay free sandstone	0	7
Marble, Italian, sawing or polishing each face	1	6
Black Marble ditto	2	6
Polishing Granite, Moruya, 3/–, and Harcourt	5	0
Sawing Malmsbury Bluestone	0	9

Polishing columns or other circular work add extra, as for circular stone cutting, see page 196. The prices stated for polishing do not include the necessary dressing required to prepare for it.

SANDHURST GRANITE COLUMNS, &c.

Polished Shafts, with swell.

Per lin. foot.	Melbourne. s. d.	Sydney. s. d.
Small size columns, per sup. ft.	40 0	45 0
Large size, ditto	35 0	40 0
Tuscan column, 10 feet (one stone) shaft with base and capital	£200	£225

SUMMARY — PRESENT RULING RATES — GOVT. WORK, SYDNEY.

Materials, Labour, &c.

Stone in blocks, any dimensions, not less than 12in. courses, with quarry faces, beds and joints, set in mortar, per cub. ft.	2	6
Ditto set in cement	2	7½
Stone footings, with axed beds and joints, set in mortar, per perch	33	0
Ditto set in cement	35	0
Foundations in Rubble, 12in. Random, set in mortar	22	0
Ditto set in cement	27	0
Through Stone Masonry, rough chiselled joints and back, clean chiselled face, set in mortar	4	3
Axed faces, beds and joints, labour only, extra, per sup. ft.	0	8
Clean chiselled face, per sup. ft., extra	1	9
Rubbed face and joints, set with putty, labour only	4	0
Wrought Stone Coring, for sills and cornices	3	0
Ditto Through Stones, set in cement, extra	0	1½
Ditto Window Sills, 11 to 14in. wide x 6¾in. thick	4	0
Ditto, with rubbed face, sunk and throated	4	3
Wrought Steps, 12 to 14in. wide x 6¾in. risers, up to 7ft. long	4	0
Freestone Flagging, 5in. to 6in. thick, chiselled, per sq. yd., set mortar	16	0
Moulded work, extra, per super ft.	1	9
Slate Damp-course, 2 courses in cement, per sup. ft.	0	10
Lead Damp-courses, per cwt.	25	0
Bowral Trachyte, for steps, pat. axed heads and risers and axed drafts, on beds and joints, 14in. x 6in.	8	0
Ditto Patent axed, extra on above	3	6
Slate, 1½in. thick, sawn and rubbed, set in cement, under 7ft. long, per sup. ft.	2	6
2in. ditto	3	0
Rubbed face, extra, per sup. ft.	0	5
Round Nosing, extra, per foot run	0	4

MARBLE MASON.

MARBLE.

There is such a richness and variety of colour, combined with soundness, in our Australian Marbles—qualities that commend themselves to the Architect and Builder—with the result that many of the principal Government and Private buildings, also vestibules of our principal theatres, are now tastefully faced and ornamented by their introduction. For localities where found *see* under BUILDING MATERIALS OF STATES.

WHITE SICILIAN MARBLE.

Net trade price.

Slabs, polished face, square edges—¾in., 2/6; 1in., 3/4; 1¼in., 4/–; 1½in., 4/9; 2in., 6/– per foot super.

Nosing Slabs—Under 2in. thick, 3d. per foot; 2in. thick, 6d. per foot run extra.

Polishing extra face, 1/– per foot super extra.

Steps and Nosing, rubbed smooth, under 7ft.—

Width.	1in.	1¼in.	1½in.	2in.
12in. and over 9in. ..	2/9	3/4	3/9	5/– per lin. ft.
9in. „ 6in. ..	2/6	3/1	3/6	4/6 „
6in. and under ..	2/3	2/10	3/3	4/– „

Polishing nosings—1in., 1¼in., 1½in., 6d.; 2in., 9d. per foot run extra.

Polished returns, up to 2in., 10d. to 1/3 each.

Polished full returns, 1/3 to 1/6 each.

Labour—Extra work.

Basin Holes, 5/–; oval, 7/6. Soap Dishes, 3/6. Mortice Holes, round, 1/–; square, 1/9; Tap Holes and Notches, 1/6; Splayed Ends, 9d. each; Returned Nosing up to 2in., 4d. each; Full Return Nosing, 9d. each; Rouned Corners, 1/– each; Rebating, 1/– ft. run. Grooving, 1/6 per ft. run extra.

Polished Coloured Marble Slabs.—¾in. thick, 4/– net; 1in., 5/–; 1¼in., 6/–; 1½in., 7/6; 2in., 9/–, up to 7ft. in one length per foot square.

EXTRAS.

7ft. to 8ft., 3d.; 8ft. to 9ft., 6d.; 9ft. to 10ft., 1/–; per super. 1in. thick.

Slabs under 12in. and over 9in., reckoned 1ft. wide; under 9in., and over 6in., reckoned 9in. wide; under 6in. and over 3in., reckoned 6in. wide.

Moulding and Polishing—Labour:—

Fluted edge, 1/– to 1/9 per foot run.

2in. Moulding and Scotia, 2/– to 2/6 per foot run.

Round-nosed Edge, 6d. to 1/– per foot run.

Rubbed Square Edge for Jointing, from 2d. to 4d. per lineal ft.

WEIGHTS PER TON.

Marble, ¾in., 222ft.; 1in., 167ft.; 1¼in., 133ft.; 1½in., 111ft.; 2in., 83ft.; 2½in., 66ft.

Slate, 1in., 150ft.; 1¼in., 120ft.; 1½in., 100ft.; 2in., 75ft.

MINTARO SLATE.—**Melbourne Prices.**

Dimensions.	Thickness.					
	1in.	1¼in.	1½in.	2in.	2½in.	3in.
Flags and Landings—						
To 15 sup. ft., per ft. ..	1/8	1/11	2/1	2/5	3/–	3/6
Over 15ft. to 25ft. add 3d. ; to 35ft. add 7d. per ft.						
Natural Face, 2d. per ft. less.						
Hearths—						
Rubbed face, square edges						
Stock sizes, to 6ft. long, per s. ft.	1/3	1/6	1/8	1/11	..	..
Nosed Kerbs and Steps—						
To 6ft. long, 11 or 12in. wide, ft.	..	..	2/4	2/10	3/1	3/8
10in. wide, 1d. less ; 9in., 2d. less ; over 12in. wide charged super.						
Over 6ft. long to 8ft., add 3d. ft.						
Returned ends charged nosing only.						
Risers—						
To 6ft. long, per lineal ft. ..	–/10	–/11	1/–	1/1	..	..
Over 6ft. to 8ft. add 2d. lin. ft.						
Shelving—						
To 6ft. long, 12in. or wider, at per super. ft.	1/10	2/–	2/2	2/6	..	..
Over 6ft. to 8ft. add 3d. per ft.						
Urinals—						
Divisions and Backs, sawn and rubbed, to 15ft. sup., per ft...	1/11	2/1	2/3	2/8	..	..
Lavatories and Copper Tops—						
Cutting basin holes included, per ft. super	3/–	3/3	3/8	4/3	..	..

Rubbing, 2d. per foot super. Nosing, 3d. to 5d. per foot run. Cartage added.

BUILDING STONE AT ADELAIDE.

Murray Bridge Limestone, a yellow limestone, hard and fine grain, 13 cub. ft. to ton .. .. .. per cub. ft. 4 0

Tapley Hill Bluestone, a variegated brown stone (about 13 cub. ft. to ton), between a slate and a blue stone per ton, about a yard super, suitable for face work .. .. per ton .. 12 0

Glen Osmond Bluestone Rubble .. .. .. 14 cub. ft. .. 8 6

Wallunga Slate .. .. per cub. ft. 4 0

Tarlee (a mudstone) **Shale Slate,** 17 cub. ft. to ton per ton .. 15 0

Victor Harbour Granite .. .. per cub. ft. 3/6 to 4 0

Angaston Red Granite, on rail .. .. .. per cub. ft. 4 0

Delivered to Adelaide .. .. .. per cub. ft. 6 0

Harcourt Grey Granite .. .. .. per cub. ft., from 5 6

SLATE.—Sydney Prices.

Slabs, Steps or Kerbs, rubbed on one face, with all square edges, or one edge round-nosed.

Cut to Sizes under 7ft. long.	Thickness.					
	1in.	1¼in.	1½in.	2in.	2½in.	3in.
Over 12in. wide, super. ft. ..	2/2	2/5	2/7	3/3	4/9	6/–
12in. and over 9in., per lin. ft. ..	2/1	2/3	2/5	3/1	4/6	5/6
9in. and over 6in., per lin. ft. ..	1/11	2/1	2/3	2/10	4/–	5/–
6in. and under, per lin. ft. ..	1/8	1/10	2/–	2/6	3/6	4/6

Extras: 7 to under 8ft., 6d.; 8 to under 9ft., 1/–; 9 to under 10ft. 1/6 per ft. extra on above prices. If rubbed both faces, add 4d. ft. extra.

Labour, extra to above.	s.	d.
Basin holes, each	4	0
Soap Dish, with drainer, each	2	0
Splayed Ends, each	0	9
Rounded Corners, each	1	0

Labour only.		
Rebating, per ft. run	0	6
Grooving, per ft. run	1	0
Tap Hole Notches, Mortice Holes, each	1	0
Return Nosings to Steps, each	0	4
Full Return Nosings, each	0	9
Rubbing, per ft. super.	0	2
Kerbs, fixing, per ft. run	0	3½
under 12in. wide .. ..2½d. to	0	3
Flagging, laying and jointing, per sup. yd.	1	6

LABOUR INCLUDING BED.

Labour—Fixing Verandah Nosings, including bed, per 6ft., 3d. to 6d.
Ditto Steps and Risers, up to 4ft. long, per step, 2/– to 2/6.
Ditto Marble Mantels, including Paster of Paris, each, from 5/–.
Laying Tiles—
Laying ¾in. Tiles, black or white, 12in. sq., laid in cement, 3/– sq. yd.
Ditto do. do. 8in. sq. do. 4/– sq. yd.
Facing Wall Work—
Ditto ¾in. **Facing** Walls, setting, including cement and pointing, from 2/– to 3/– sq. yd.
Ditto Fixing Dado Mouldings, 3in., per foot run, 3d.
Ditto Skirtings to bathrooms, 6in. x ¾in., per foot run, 2½d.
Copper Clamps, letting in and fixing, each, 1/3.

STONE CARVING.

Labour only, each item.

Add 20 per cent. for roughing out by mason.

	£ s. d. Spring Bay Stone.	£ s. d. Sydney Stone.	£ s. d. Oamaru Stone.
Ionic capital, Grecian or Roman for 6 in column (major diam.)	2 16 0	2 5 0	1 6 0
Ditto 9in. do. do.	3 17 0	3 5 0	1 17 0
Ditto 12in. do. do.	5 7 0	4 10 0	2 10 0
Ditto 18in. do. do.	7 0 0	6 5 0	3 10 0
Ditto 24in. do. do.	10 0 0	8 10 0	5 0 0
Ditto 30in. do. do.	12 0 0	9 15 0	6 0 0
For quarter pilasters one-half and for bases one-fourth the above. If enriched, add 20 per cent.			
Modillions, Ionic, or plain moulded, 3in. projection	0 4 6	0 3 9	0 2 3
Ditto 4½in. do., plain moulded ..	0 6 0	0 5 0	0 3 0
Ditto, 6in. do. do.	0 7 6	0 6 3	0 3 9
Cantilevers or trusses, 9in. do. do.	0 10 6	0 8 9	0 5 3
Ditto, 12in. do. do. ..	0 15 0	0 12 6	0 7 6
Corinthian or composite capital for 6in. (major diam.) column ..	4 10 0	3 15 0	2 5 0
9in. do. do. ..	7 10 0	6 5 0	3 15 0
12in. do. do. ..	12 0 0	10 0 0	6 0 0
18in. do. do. ..	16 0 0	14 0 0	8 0 0
24in. do. do. ..	20 0 0	17 0 0	10 0 0
30in. do. do. ..	24 0 0	21 0 0	12 0 0
For quarter pilasters one-half and for bases one-fourth the above.			
Paterae or rosette (rich), 4in. diam.	0 7 6	0 6 0	0 3 6
Ditto 6in. do...	0 9 0	0 7 6	0 4 9
Ditto 9in. do...	0 15 0	0 12 6	0 7 6
Centre flower (rich) 12in. do...	1 2 6	0 19 0	0 11 3
Ditto 18in. do...	1 17 6	1 12 0	0 18 9
Ditto 12in. do...	2 15 0	2 6 0	1 7 0
Mask or head, 4in.	0 9 0	0 7 6	0 4 6
Ditto 6in.	0 18 0	0 15 0	0 9 0
Ditto 9in.	1 4 0	1 0 0	0 12 0
Ditto 12in.	1 10 0	1 5 0	0 15 0
Ditto 15in.	1 17 0	1 11 0	0 18 0

In carved work the stone is cubed in the rough; if prepared by the stone-cutter, the clean chiselling or boastering is reckoned by the super. foot, to which is added the cost of carving.

	Spring Bay Stone.			Sydney Stone.			Oamaru Stone		
	£	s.	d.	£	s.	d.	£	s.	d.
Acanthus leaf, 4in. long	0	6	0	0	5	0	0	3	0
Ditto 6in. do.	0	9	0	0	7	6	0	4	6
Ditto 9in. do.	0	12	0	0	10	0	0	6	0
Ditto 12in. do.	0	15	0	0	12	6	0	7	6
Loftus leaves, one-half the above.									
Oak or laurel wreath, 6in. diam. ..	0	15	0	0	12	6	0	7	6
Ditto do. 9in. do. ..	0	18	0	0	15	0	0	9	0
Ditto. do. 12in. do. ..	1	4	0	1	0	0	0	12	0
Oak leaf and corn frieze, with leaves 2in. long, per ft. sup.	1	7	0	1	2	6	0	13	6
Ditto do. 4in. do. do. ..	1	1	0	0	17	6	0	10	6
Panels sunk and moulded from 9 to 12in. square, and 1½ to 2in. deep rubbed	0	15	0	0	12	0	0	7	6
If undercut, add from 25 to 50 per cent.									

CARVING MOULDINGS.

Per foot run.

Egg and dart moulding, 1½in. girt .	0	4	6	0	3	9	0	2	3
Ditto do. 2in. do...	0	5	3	0	4	6	0	2	8
Ditto do. 3in. do...	0	6	0	0	5	0	0	3	0
Ditto do. 4in. do...	0	6	9	0	5	9	0	3	5
Rope or cable moulding, 2in. do. ..	0	3	0	0	2	6	0	1	6
Ditto do. 3in. do. ..	0	4	6	0	3	9	0	2	3
Guillochis moulding, single, 3in. ..	0	6	0	0	5	0	0	3	0
Ditto, 4in. ditto	0	7	6	0	6	3	0	3	9
Ditto, 6in. ditto	0	9	0	0	7	6	0	4	6
Ditto, enriched, add 50 per cent.									

N.B.—The whole of the above items are presumed to be prepared by the stone-cutter as required, if not, add from 20 to 25 per cent. for preparing the stone or roughing out, and 8 per cent. for mortar and setting.

Stone Carving, which is generally fixed at a considerable height above the observer, does not require that degree of finish or delicacy of outline required in wood carving, which is generally fixed much nearer to the eye. In all ornamental work the time required to model or carve a given *Piece* depends materially upon the degree of finish, or *minutiae*, aimed at.

If any of the above items are required in Barrabool Hills, or South Australian freestone, the price will be about one-half that given for Spring Bay stone; for bluestone twice the price of Spring Bay stone; and for Adelaide marble or Moruya granite about thrice the cost of Spring Bay stone.

N.B.—In stone cutting the superficial measurement of girt is always taken, but when let at one price with the material, the length and breadth only are taken, and not the girt, for superficial measurement. Generally when the materials and labour are let together the same measurement is taken as for materials only.

METAL WORK.

ALUMINIUM.

(*Extracts from Richards on Aluminium.*)

Aluminium is the lightest of commercial metals, $\frac{1}{3}$ as heavy as iron, hard as copper, very ductile and easy to cast in iron or sand moulds, and hardens more when being worked.

Being non-magnetic and non-tarnishing, it can be used for electrical work where a magnetic metal would be useless, but the electrical conductiveness is 34 per cent. less than copper, and requires less annealing than copper. With the exception of lead, it unites readily with all the common metals.

Hydrochloric acid is its natural solvent.

For light structural purposes it is invaluable.

Pittsburgh Reduction Company, Niagara Falls, have the largest works and output.

ALUMINIUM.

Weight of per square foot in lbs. and decimals.

Gauge.	Weight per square foot.	In Sheets 24in. x 96in.
12	1.406lbs.	$11\frac{1}{4}$lbs.
16	.906 ,,	$7\frac{1}{4}$,,
18	.687 ,,	$5\frac{1}{2}$,,
20	.25 ,,	4 ,,

A cubic foot of Aluminium weighs 166lbs.

Price of Aluminium.

Ingots, per lb., 3/– ; Sheets, per lb., 3/6 ; Round Bars, per lb., 4/– ; Flat Bars, per lb., 5/– ; Wire, per lb., 4/6.

COPPER AND ITS ALLOYS.

Metal Manufactured.	Copper.	Zinc.	Nickel.	Tin.	
German Silver	60 %	20%	20%	—	100 pts.
White Metal	56%	5%	39%	—	100 pts.
Gun Metal	90%	—	—	10%	100 pts.
Bell Metal	80%	—	—	20%	100 pts.
Rolled Brass	60%	40%	—	—	100 pts.
Flexible Bronze	95%	—	—	5%	100 pts.

MELTING POINTS OF METALS.

(*Prof. Roberts-Austen.*)

	Deg. Fahr.		Deg. Fahr.
Aluminium (pure) ..	1,289	Mercury	—39
Antimony	810	Nickel	2,810
Bismuth	510	Platinum	3,080
Brass	1,650	Steel (hard)	2,570
Silver	1,733	Steel (mild)	2,687
Gold	1,913	Tin	446
Iron (cast)	1,920 to 2,012	Zinc	779
Iron (wrought) ..	2,912	Copper	1,929
Lead	612		

SHRINKAGE OF CASTINGS.

(*From Pattern Maker's Rule.*)

Aluminium, Brass, Copper, Zinc	3/16in.	Tin	1/12in.
Cast Iron, and Lead	$\frac{1}{8}$in.	Steel	$\frac{1}{4}$in.

SOLDERS.

(*From Metal Trade Referee.*)

For **lead**	1 part tin, 2 parts lead.
For **brass**	2 parts brass, 1 part zinc.
Hard solder	2 parts copper, 1 part zinc.
Soft solder	2 parts tin, 1 part lead.

FLUXES FOR SOLDERING.

Tinned iron	Resin or spirits of salts.
Copper and **brass**	Sal ammonia or spirits of salts.
Zinc	Spirits of salts. **Lead**, Resin.

SHEET COPPER (*per square foot*).

At £70 per ton.

Size of Sheets	6ft. x 3ft.		6ft. x 4ft.	
Gauge	28	26	24	22
Approx. weight	12oz.	15oz.	11lb. 2oz.	11lb. 7oz.
Price per lb., cut ..	1/4	1/3	1/3	1/3

Size of Sheets	6ft. x 4ft.			
Gauge	20	18	16	14
Approx. weight	11lb. 12oz.	21lb. 40z.	31lb.	31lb. 12oz.
Price per lb., cut ..	11d.	to		1/3

BAR COPPER (*per pound*).

At £70 per ton.

Round—	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$ to 1$\frac{1}{2}$in.
By the Bar ..	1/5	1/3	1/2	1/1lb.
Cut Bars	1/7	1/4	1/3	1/2lb.

Square, 1$\frac{1}{4}$, 1$\frac{1}{2}$, 1$\frac{3}{4}$ inches—By the Bar, 1/1 ; Cut Bars, 1/2 per lb.

COPPER CORD.

For Window Sash Line, Hot Houses, etc.

Gauge.	Circum.	Working Load.	Price, 100ft.
No. 1	1$\frac{1}{8}$ inch	336lbs.	60/–
No. 2	1 ,,	224 ,,	40/–
No. 3	$\frac{3}{4}$,,	168 ,,	30/–
No. 4	$\frac{5}{8}$,,	112 ,,	25/–
No. 5	$\frac{1}{2}$,,	75 ,,	15/–
No. 6	$\frac{3}{8}$,,	50 ,,	12/6
No. 7	$\frac{1}{4}$,,	34 ,,	10/–

TINNED STEEL SHEETS.

Best Charcoal Finish, 6ft. long x 2ft., 2$\frac{1}{2}$ft., 3ft. wide.

20 gauge, per cwt., 38/– ; per lb.	0	4	$\frac{1}{2}$
22, 24 and 26 gauge, per cwt, 40/– ; per lb.	0	5	

SHEET BRASS.

Size of Sheets, 4ft. x 2ft.

Gauge	28	26	24	22	20
Approx. weight, sq. ft. ..	11oz.	14oz.	1lb. 1oz.	1lb. 6oz.	1lb. 11oz.
Price per lb., cut ..	1/3	1/2	1/1	1/1	1/1

Gauge	18	16	14	12
Approx. weight per ft. ..	2lb. 1oz.	2lb. 12oz.	3lb. 8oz.	4lb. 13oz.
Price per lb., cut ..	10d.	to		1/1

SHEET ZINC.

Perforated (7ft. x 3ft. Sheets).

8 hole x 7 gauge, 3/6 per sheet, or 2d. per sq. ft.
3/16 to $\frac{7}{8}$ hole x 12 gauge, 7/– per sheet, or 4½d. per sq. ft.

ZINC GAUGES AND WEIGHTS.

Zinc Gauge	Ounces per square Foot.	Approximate Weight per Sheet.							
		7 x 2·8		7 x 3		8 x 2·8		8 x 3	
		lbs.	ozs.	lbs.	ozs.	lbs.	ozs.	lbs.	ozs.
4	abt. 5	5	13	7	9	6	11	7	8
5	,, 6	7	0	7	14	8	0	9	0
6	,, 7	8	3	9	3	9	5½	10	8
7	,, 8	9	5	10	8	10	10	12	0
8	,, 9½	10	8	11	13	12	0	13	12
9	,, 11	12	13	14	7	14	11	16	8
10	,, 13	15	3	17	1	17	5	19	8
11	,, 15	17	8	19	11	20	0	22	8
12	,, 17	19	13	22	5	22	11	25	8
13	,, 19½	22	12	25	9½	26	0	29	4
14	,, 22	25	11	28	14	29	5	33	0
15	,, 24	28	0	31	8	32	0	36	0
16	,, 26	30	5	34	2	34	11	39	0
17	,, 30	35	0	39	6	40	0	45	0

Mem.—If sheet zinc contains any *iron* in its composition, it will not resist the action of the air, and is no better than damaged or inferior galvanised iron. It is essential that it should be perfectly malleable, or it will crack with too sudden changes of temperature ; the best test of its malleability is to double the corners backwards and forwards, which ought not to crack it.

Care must be taken to allow for *contraction* and *expansion*, which may be effectually guarded against if properly laid.

Labour to zinc and galvanised iron is about the same. *See* Plumber.

Weight of Metals.—To find the weight in lbs. multiply the cubical inches of zinc by 25, cast iron, tin or white metal by 26, wrought iron or steel by 28, brass by 30, copper or gun metal by 31, lead by 41 ; cut off two figures to the right, the remainder will be lbs.

TABLE *of the Weight of a Superficial Foot of various Metals, in lbs*

Names.	Thickness by the Birmingham Wire Gauge.												
	1	2	3	4	5	6	7	8	9	10	11	12	
Iron	12.50	12.00	11.00	10.00	8 74	8.12	7.50	6.86	6.24	5.62	5.00	4.38	
Copper ...	14 50	13.90	12.75	11.60	10.10	9.40	8.70	7.90	7.20	6.50	5.80	5.08	
Brass ...	13.75	13.20	12.10	11.00	9.61	8.93	8.25	7.54	6.86	6.18	5.50	4.81	
	Thickness by the Birmingham Wire Gauge.												
	13	14	15	16	17	18	20	22	24	26	28	30	
Iron	3.75	3.12	2 82	2.50	2.18	1.86	1.54	1.25	1.00	0.80	0.64	0.50	
Copper ...	4.34	3.60	3.27	2.90	2.52	2.15	1.78	1.45	1.16	0.92	0.74	0.58	
Brass ...	4.12	3.43	3.10	2.75	2.40	2.04	1.69	1.37	1.10	0.88	0.70	0.55	
	Thickness, in parts of an inch.												
	$\frac{1}{16}$	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1	
Iron	2.5	5.	7.5	10.	12.5	15.	17.5	20.	25.	30.	35.	40.	
Copper ...	2.9	5.8	8 7	11 6	14 5	17.4	20.3	23 2	28.9	34.7	40.4	46.2	
Brass ...	2.7	5.5	8.2	10.9	13.6	16.3	19.0	31.3	27 1	32.5	37.9	43.3	
Lead ...	3.7	7.4	11.1	14.8	18.5	22.2	25 9	29 6	37.0	44 4	57.8	59.2	

VENTILATORS.

Stamped and Cast Zinc.

Louvre Vents, cast, 9in. x 6in., 16/6 per doz. ; 9in. x 3in. .. 11/3
Open Vents, 12in. x 6in., 1/6 each. Grating, 15in. x 6in., each .. 2/6
Hit or Miss Vents, stamped, with box, 9in. x 6in., 16/6 per doz. ; 9in. x 3in., per doz. 13/6
Circular H. or M. Vents, 12in. dia., 3/6 ; 14in. dia. 3/9
Flap Vent, with pulley 9in. x 6in. 5/–

ZINC GLAZING BARS.

Waterproof, fitted with capping, straight, per lineal ft. 1/5 and 1/9
Ditto do. stepped, per foot 2/–
Brass attachments, shoe and head, per set 1/5

ZINC ROOFING.

In Sheets, 6ft. 10in. x 2ft. 10in. wide—Per sq. yard.

Zinc Fish-scales, small pattern, 4in., 6/6 ; 5½in., 6/9 ; 7½in. .. 7/–
Interlocking Zinc Roofing Tiles—
100 to 150 to the square of 100 super ft., per square 63/– to 75/–
Roof Ridges and Crestings, 12in. per foot run .. .. 1/9 to 2/10
Eaves, Cornice 24in. high x 15in. projection, per foot run .. 3/–
Zinc Skylight, to any size fixed light, per sq. ft., 1/9 ; hinged 2/9
Zinc **Sash Bar** with **T iron,** 1¼in. x 1¼in. x ⅜in., per foot run 1/9
12in. semi-cir. **Louvre Ventilator,** 18in. long, with flashing, each 30/–
Lunettes, or Window Facings, for Mansard roofs, 36in. x 20in. 70/–
Zinc rosettes, per lb. .. .. 1 0 to 1 4
Ditto, friezes, finials, &c. 1 0

(*See* also **Glazing Bars,** Index Glazing.)

ZINC FINIALS.

Height	11in.	21in.	24in.	30in.	36in
Price, from ..	5/6	15/–	20/–	25/–	32/6

BRASS AND COPPER.

	s. d.	s. d.
Brass or bronze castings, per lb.	1 6	to 1 8
Cast copper cramps, or other castings, do., per lb. ..	1 4	to 1 6
Sheet and bolt copper, per lb.	1 4	to 1 6
Copper tubes, ⅛in. thick, as below, per lb.	1 6	to 1 9
Muntz Metal, per ft. sup., 16, 18, and 20oz., sheets 4ft. by 14in., per lb.	0 7½	to 1 0
Ditto, bolts and straps, at Sydney, per lb.	0 11	to 1 0

N.B.—The weight of a brass or bronze casting will be 3¾ times the weight of a similar plaster of Paris casting.

	£	s	d
Spun Metal Balusters—16in. x ¾in. square	0	18	0
24in. x 1in. square	1	3	0
Stamped Copper and Bronze Reposse Work in Floral and other designs, according to design, per ft.	0	10	0
Name Plates, finger plates, 24in. x 6½in., each	2	5	0

	Material per sq. yd.	Labour Fixing Ceilings, including battens.
Ceilings—		
Diapers	1/10 to 2/3	from 2/– per sq. yd.
Panelling	2/2 to 2/9	,, 2/6 ,,
Panels	From 4/–	,, 3/6 ,,

Cornices, etc.—

Border Finishes	width	5in.	6in.	8in.	9in.	12in.
Price, per ft. ..		3d.	3¼d.	4d.	4½d.	6¾d.
Cornices	girth	3in.	6in.	9in.	12in.	15in.	18in.
Price, per ft.		1½d.	2¾d.	4d.	5d.	6¾d.	7½d.
Borders,	width	6in.	9in.	12in.	18in.	24in.
Price, per ft. ..		2½d.	3½d.	4½d.	6d.	8d.
Friezes,	width	6in.	9in.	12in.	18in.	24in.
Price, per ft.		2½d	3½d to 5d	4½d to 7d	6d to 10d	8d to 11d

Mitre Leaves, Corners, from 5d., 9d., 1/3 to 2/4.

Labour, Fixing Cornices, including Bracketing, 2d. to 6d. per ft. run. according to girth.

STEEL WALL LINING, DADOS, etc.

Dados, height ..	2ft. 6in. panel.	3ft. panel.	4ft. plain.
Price, per ft. run .	10d.	10d. to 1/–	10d.

Neck Mouldings, per lineal foot, from 2½d. to 6d.

Dado Cappings, per lineal foot, from 2½d. to 6d.

GAL. ROCK-FACED SHEETING.

Suitable for Garden Walling, etc.	Material, per sq. yd.
	s. d. s. d.
Painted and sanded	6 0 to 6 6
Brick Sheeting, per sq. yard	2 4
Labour, fixing, per yard, from	0 6

For estimates fixed, *see* advt. pages 2, 21, 24, 26.

STAIR TREADS.

Stair Tread, polished corrugated brass, drawn, and nosing protector, per ft. run	0	2	0
Stair Tread, cast brass chequered	0	1	3
Ditto, with polished nose, 1/6; filed	0	1	9
Rolled mild **Steel Treads,** 3in. to 6in. wide, per ft. 4d. to	0	1	0
Rolled **Brass Treads,** 3in. to 6in. wide, per ft. .. 4d. to	0	2	0
Steel Stair Treads, with anchor attachment for concrete stairs, per lb., from	0	0	7
Lead fitted Steel Treads and Nosings, 3in. to 6in. wide, from .. .. 1/– to	0	5	0
Lead fitted Brass Nosings, 3in. to 6in. wide, from .. 3/6 to	0	5	8

For details, *see* advt. page 37.

Composition Stair Treads, per ft. run, 2in. wide, 10d.; 3in., 1/3; 4in.	0	1	7

See advt. page 2.

Triangular Brass Stair Rods, 27in. x ⅜in., per doz. ..	1	1	0
Eyes to suit, per doz. .. .. 4/– to	0	5	6
Ditto, 27in. x 1in., per doz.	1	15	0

METAL ENCASED MOULDINGS FOR SHOP FRONTS.

White Metal, "Silverite," Bronze, Copper, and Brass.

12ft. to 18ft. lengths without jointing metal.

Material without fixing.	Per ft. run s.	d.
Corner posts, 2½in. dia., ¾-round .. wood sizes	4	0
,, ,, 2in. ,, ,, .. ,, ...	2	6
Double rebated Corner posts, 1½in. dia., ¾ round	1	9
Base, Mould or Cornice, 5in. x 3in. O.G. and Bead ..	5	0
,, ,, 3½in. x 3½in. ,, ...	4	9
,, ,, 4in. x 2½in., O.G. and square ..	4	0
,, ,, 3in. x 2in., 2in. dia., ¾ round ..	3	0
,, ,, 3in. x 2in., ovolo and square ..	2	6
Intermediate meeting, 2in. dia., ½ round	2	0
,, , Scotia or Torus .. 1/– and	1	6
Top mould, 2in. dia., ¼ round	1	9
Base moulds, 3 ovolo, O.G. .. .. .. 5/– to	2	0
Small cover moulds .. .. upwards	0	8
Centre Sash, double lamb's tongue, 3in. x 3½in., per ft. ..	3	6
Side Sash, single lamb's tongue, 2in. x ¾in., per ft. ..	2	6
Caps and Bases, for 2in. to 3½in. dia. bar, each 7/6 to	15	0
Stamped **egg and dart** mould, 2in. dia., per ft.	2	9

Zinc moulds 10 per cent. less than above.

Shop Window, Fixed Complete.

	£	s	d
Copper, Bronze, Brass, or Nickel columns, for shop fronts, 2in. dia up to 18ft. long, with caps and bases, fixed complete, each	3	0	0
Brass Metal boards, for foot of show windows, 9in. wide, per lineal foot, according to design .. .. 10/– to	7	10	0

For further information, *see* advt. pages 2, 21, 24, 26 and 31.

RAISED METAL LETTERS.

Gilt, Silvered, or Electroplate.

2in. to 12in. high, 1/4 to 5/6 per letter ; 15in. to 24in., 7/6 to 17/6 ; 30in., 25/– ; 36in., 30/– ; 48in., 57/6.

Concave Copper Letter (gilded) fixed in position—1in. to 4in. 6d. to 2/– ; 5in. to 10in., 2/6 to 5/9.

Metal Ribbon backgrounds and scrolls, 2d. per inch depth, extra on above.

Built Block Letters, (Zinc.) From 1ft. to 6ft. high, from 5/6 each.

Half Round (Section) Metal Letters, Plain Zinc, with clips for fixing to woodwork—

2in. high, 6d. each ; 4in., 8d. ; 6in., 1/2 ; 9in., 1/8 ; 12in., 2/6 ; 15in., 3/–; 18in., 5/– ; 24in., 10/–. From 24in. to 72in.

Numerals at same prices as letters.

See advt. pages 2, 21, 24, 26.

LIGHTNING CONDUCTORS.

Market Price of Copper, £90 per ton.	£	s.	d.
Lightning Conductors, **tape**, 1⅛in. x ⅛in., per 100ft. ..	5	0	0
Ditto do do rope, ½in. dia., per 100ft. ..	5	5	0
Elevating **tube** and **terminals**, complete	1	17	6
Copper **Earth Plate**, 24in. x 12in. x ⅛in., each	0	15	0
Lightning Arresters, Automatic, each	1	10	0
Plain solid **copper point**, with coupling for rope end, and copper elevating tube, 4ft. long	1	10	0
Solid copper point, with 3 attractors, 3in. Holdfast for passing along slated roof, per doz.	0	10	6
Copper holdfast clips, each 6d. Insulators, each	0	1	0

In using copper tubes or hollow balls it is necessary that all points of junction or contact should be sweated or soldered so that the inside cannot be impaired by dust or dirt.

Labour, fixing, from, per ft. run	0	6 to 0	8
Angle Strips or Staff Beads, steel, **Wall Corner Protectors** with anchor attachment, per ft. ..	4d. to 0	0	8
Ornamental Rolled Steel Sections and Moulds for Lift enclosures, per cub. ft., from	1d. to 0	0	5½

GUN AND MUNTZ METAL.

Per lb., including patterns and fixing.	s.	d.
Gun metal to top railing and curved balusters of lighthouse ..	1	6
Ditto casements about 30lbs each, size 24in. x 12in.	2	0
Ditto sluice valves to sewer pipes	1	9

For the weight of muntz metal sheets, reckon the same weight as brass. *See* Index.

SHEATHING PILES.

Sheathing piles with 20oz. muntz metal to 18in. below rock on planted piles, and 6ft. below ground on driven piles, including 1½in. muntz metal nails for ditto, ¾lbs. to each sheet, size of sheets, 48in. x 14in.	1	3	
Fixing No. 20 gauge muntz metal, round piles from 10 to 20ft. under water, including nails, as before	2	0	

DIVER.

N.B.—The charge for a diver and two attendants, including all necessary apparatus, is £3 to £4 per day from 9 a.m. to 4 p.m. A diver will nail on to piles about 14 sheets of muntz metal per day.

Diving apparatus, complete in the Australian cities, from £135 to £175.

Cement for Iron Pipe Joints.

Ten pounds of ground litherage, best quality, four pounds of best Paris whiting, one-half a pound of yellow ochre, two pounds of dry red lead, one-half an ounce of hemp cut in half-inch lengths ; mix well with boiled linseed oil to the consistency of thick putty ; ; make joints in usual way. The above mixture will set quick when heat is applied. It repairs boilers, resists fire, and will set in water,

N.B.—In this as in all other cases where washes, fluids, or paint is applied, unless the timber is seasoned it will hasten its decay by retaining the pyroligneous acid found in all unseasoned timber. The following Australian timbers when dried or seasoned are said not to be molested by white ants, viz., the Jarrah and Turpentine. (*See* Index.)

In measuring painting, allow for all edgings, sinkings, or girths. In iron railing, and other open work, it is usual to take the two sides as flat work, and ornamental or small work twice for each side including Louvre blinds or lattice work.

Sashes and Frames should be measured as plain surfaces, including the glass and the exposed part of frames, with linings, &c., which should be girted ; but if the squares exceed 3 super feet, then it is better to take the sash bars by the lineal yard.

MEMORANDUM.

White lead is the material for foundation of paint. **Linseed oil** is the vehicle and preservative, and forms a protective surface. To prevent blistering of this skin, boiled linseed oil is used in external work, and gives a glossy surface. The life of paint depends largely upon the quality of linseed oil used in the making.

Turps, the usual solvent, causes the paint to work freer and thinner and to cover more surface.

Driers causes skin to solidfy by absorbing the oxygen.

Oxide of iron paints are the best for covering iron or metal, as they combine chemically with particles of surface covered.

The first coat on plaster or cement should be primed with boiled oil. Flatting coats are mixed with turpentine only.

NOTES ON PAINTING.

A good even finish cannot be made of rough surface.

Two coat work is unsatisfactory.

Add more oil to paint on porous surfaces.

Do not thin paint with oil and driers to save labour, rub paint well into surface.

Add more turps for work to stand the sun and prevent blistering.

Clear white turps is better than yellow ; also pale linseed oil is better than a greenish yellow.

Do not put too much oil in second coat.

Boiled oil will crack, but gives a better finish and gloss.

To soften and clean a hard set paint brush, make some turps hot in a fry-pan, and well rub and work brush in the boiling liquid.

TABLE SHOWING PRODUCTION OF TINTS BY MIXING.

Sky Blue—White and Prussian Blue.
Coral—White and Venetian Red.
Silver Grey—White and Black.
Buff—White, Orange, Chrome and Oxford Stone Ochre ; or White, Yellow Chrome, and Oxford Ochre.
Azure Blue—White and Ultramarine.

Rough Rule for Ascertaining the Amount of Paint required to cover a desired surface.

Extract from "American Paint Co."

Example—House 20 x 40 x 30ft. high ; 2 coat work.

Add the number of feet in width front and rear to the number of feet in length, both sides ; multiply this with the average height ; this divided by 300 will give the amount in gallons for two coats.

Thus 20 + 20 + 80 = 120 × 30ft. high = 3600 ÷ 300 = 12 gallons.

No rule can be given for accurately determining the amount required, but the above is sufficiently correct for all practical purposes.

Should the surface be rough and porous, more paint will be required.

One gallon covers on good surface—1 coat, 35 sq. yards ; 2 coats. 25 sq. yards ; 3 coats, 18 sq. yards.

MATERIAL REQUIRED TO COVER 100 SQUARE YARDS WROUGHT PINE.

(From "American Painter's Reference.")

Inside Work.

Each coat.	Boiled Linseed Oil. Pints.	Raw Linseed Oil. Pints.	Turpentine. Pints.	Driers. ozs.	White Lead. lbs.	Red Lead. lbs.
Priming ..	—	5	½	2	12	2
2nd coat ..	½	3	½	1½	10	
3rd coat ..	½	3	½	1½	10	
4th coat ..		3	½	1½	10	
Flatting ..			2½	1½	8	
	1	14	4½	8	50	2
Outside Work —						
Priming ..	2	2	½	2	16	
2nd coat ..	2	2	1	1¾	14	
3rd coat ..	2½	2½	¾	1½	13	
4th coat ..	2½	3	¼	1½	12	
	9	9½	2½	6¾	55	2

AMOUNT OF PIGMENT ADDED TO 50lbs. WHITE LEAD, &c.

To form Colours.

White Paint	2lbs. Blue.	Black (no lead)	50lbs. Lamp Blk.
Stone (Dark)	1lb. Bt. Umber.	Green ,,	50lb. Verdigris.
Stone (Light)	½lb. ,,	Red Lead, 25 ;	red ochre, 25lbs.
Lead Colour	1lb. Lamp Black	Chocolate—Lamp Blk.,	2lbs., Span. Brn,, 48lbs

PAINTERS' AND DECORATORS' MATERIAL.

Prices subject to fluctuation.

Red Lead, 4d. per lb., or 34/– per cwt. (keg).
White Lead—Champion's, 49/– per cwt.; Fergusson's, 40/– per cwt.
White Lead—Locke and Blackwood, 40/– per cwt.; Walker's, 40/– per cwt.
"Dixon's White," 38/6 per cwt. Zinc white (English), 50/6 per cwt.
Linseed Oil—Blundell & Spence, raw, 4/2 per gal.; boiled, 4/4 per gal.
Linseed Oil—Meggitt's, raw, 4/1; boiled, 4/3.
Wood Preserving Oil, 8/6 per 8 gal. case. Castor Oil, 3/7 per gal.; Lubricating, 1/6 per gal. Terebene, 10/– per gal. Turps, 4/– per gal.; "Dryolene," 11/6 per gal.
"Rogg" Oil—pale, 7/10 per gal.; ordinary, 6/6 per gal.
Sipes' Paint Oil, 40/– per case.
Knotty Composition, 10/– per gal. Japan Gold Size, 10/– per gal.
Naptha, 2/11 per gal.; Methylated Spirits, 3/– per gal.
Gal. Iron Primer, B. & P., 12/– per gal.
Structural Steel or Iron Paint, 7/6 to 9/– per gal.
Putty, soft, 2½d. per lb.; 15/– per cwt.
Zinc Powder, 30/– per cwt.
Pumice Stone, 3d. per lb.; Caustic Soda, 18/– per cwt. Potash, 5d. per lb.
Shellac, 3/– per lb. French Polish, 12/– per gal.; Brunswick Black, 8/– per gal.
Ready Mixed Paints, per lb., in tins, from 6d.
Hessian & Scrim rolls of 50yrds., 6d. per yard.
Colouring Materials, per lb.—
Lamp Black, 4d.; Drop Black, 1/–; Vegetable Black, 1/6.
Raw and Burnt Sienna in Oil, 10d. Venetian Red, 2½d.; Red Raddle, 3d.; India Red, 7d.; Chinese Red, 1/6.
Burnt and Raw Umber, 10d.; Purple Brown, 6d. Yellow Ochre, 2½d.
Aluminium Enamel, per pint tin, 3/6. Aluminium Bronze, per lb., 6d.; Aluminium Leaf, per book, 3d.
Gold Leaf, per book, 1/3; Silver Leaf, per book, 3d.
Alumnoid, Fuller's (American), per lb., 6/–.
Docker's Varnish Stains, per quart, 2/6.
Best **Copal Varnish**, exterior use, 14/6; interior use, 13/6; for wall paper, per gal., 18/6.
Oak Varnish, per gal., 9/– to 11/–.
Black Japan Varnish, for mantels, per gal., 14/6.
Enamelling and Finishing Paints—
Enamelac Bergers, 3/9 to 15/– per gal.
Velure, flat or gloss enamel, 27/6 to 87/6 per gal.
Bon-Accord, 15/– per gal.
Repolin Paint, enamel or flat, 27/6 per gal.
Metallic Paints, &c. (H. Brooks & Co., Sydney and Melbourne).
"Pacific Rubber Paints" (Fuller's), 9/– per gal. *See* agents' advt. page 44.
Berger's Mixed Paints, 12/6 per gal.
Rickshaw pure liquid high-class paint, 13/6 per gal. *See* advt, page 22.
Japonel Enamel, a high-class enamel, 25/6 per gal.
"Mirrowyt" (Bigsby's), 34/– per cwt.

DISTEMPER AND COLOURINGS—MATERIAL ONLY.

	£	s.	d.
Arabic, a dry mineral powder for colouring gal. iron roofs and outside walls; mixed with water. In colours, blue, white, and terra cotta. Said to prevent rust on iron, and does not contaminate rain water. 11lb. packet covers 30 sq. yards on dressed pine.			
Alabastine, Church's—a dry powder, in 27 tints; to mix with water; for internal wall work; mixed with oils for priming and red brick painting before tuck work, 5lb. packet	0	1	9
Duresco, for decorative colouring and stippling, per cwt. ..	2	5	0
Kalsomine, Johnston's, for interior decoration, to mix with hot water, 5lb. packets, white, 1/6; colours, p r packet .. .. 1/9 and	0	1	10
Calcimine, cold water distemper, 5lb. packet, all colours ..	0	1	0
Indricine, cold water distemper, for outdoor work, all colours, per 5lb. packet	0	1	10
Hodges' Pat. Cold Water Kalsomine, 17 tints, 5lb. packets	0	1	3
Endura Cold Water Paint, for rough surfaces, where ordinary oil paint cannot be used. Oxydised Paint can be used with a spray, 2½d. per lb. mixed.			
Jelstone, 5lb. packets	0	1	2
Indeliblo.—A cold water paint, can be washed with hot soap and water, or scrubbed, per 7lb. packet	0	1	9
Pulverite, per cwt.	1	18	6
Hall's Distemper, 70 tints, sanitary, cold water paint, washable; 1lb. will cover 45 yards; per 7lb. tin	0	3	3
Automatic Spray Machines, for large surfaces. Have been used with success. Acetylene gas. 4 gal. capacity ..	7	10	0
There are several kinds, from the simple bucket syringe, 45/–, to the hand force pump description. Acetylene gas is also used as a generator of force required. *See* Index PLANT.			
"Aerograph" Spray Painter, used for lead oil or water paints by means of compressed air	5	5	0

High-class Distempers and Cold Water Paints—

"Gynoles" Oil-bound Distemper (washable).

"Matone." Distemper in Oil.

"Wallarino" washable cold water paint, all colours, for brickwork, 1/3 per packet, 26/– per cwt.: Melbourne and Sydney. *See* agents advt. page 39.

"Keystonia," flat finish, 13/6 per gal.; preparatory liquid, 8/6 per gal.

"Olsina" Water Paint, all tints (Mander Bros.),/ 3– per 7lb. tin, or 48/– per cwt.

Waterproofing Paints, Powders, and Compositions—

"Wadadjerie" weather-proof paint (dark stone, olive green and brown), 7/6 per gal. Agents: 18 Bridge-street, Sydney.

"Pudlo," cement waterproofing powder. *See* page 88.

No. 232 R.I.W. damp resisting paint, 12/6 per U.S. gal. for application to inside of brick walls as a damp-proof resister.

Toch Bros.' "Liquid Konkerit," in 7 colours, grey to chocolate, for damp-proofing cement, concrete, brick, 13/6 U.S. gal. 1 gal. covers 150 sq. yds. *See* agents' page 22.

Carter's Damp-proof Wall Composition, 6/– per gal.

B. & P. Damp Resister, 10/6 per gal.

TO MAKE WALLS WATERPROOF.

Sylvester's Process.—Castile Soap and Alum Coats.

First Coat.—Mix ¾lb. Castile Soap to one gallon of water; apply hot with brush, allow 24 hours to dry, then apply.

Second Coat.—Viz., mix ½lb. alum to 4 gal. water; after 24 hours repeat the coats. A chemical glaze is formed which is said to be impervious for years.

PATENT PAINTS.

Ferrodor Paint is a preservative paint for steel, iron, or timber. It is said to be superior to oxide of iron or red lead, as it will not crack or peel off. 1 cwt. covers when mixed, 713 sq. yards, and a gallon weighs 18½lbs. Red lead covers 377 sq. yards, and a gallon weighs 36½lbs. To thin the paint add 30lbs. pure boiled Linseed Oil to 1 cwt. of paste. About 50/– per cwt.

	£	s.	d.
Avenarius wood preservative oil and white ant destroyer—for ropes and walls, fence posts, per gallon	0	4	6
Bain's White Ant Exterminator. *See* advt. page 30 ..	0	4	0
Jodelite, for preventing fungus and dry rot, white ant and teredo navalis, or sea worm; also for preserving wood paving, wharf piles, bridge beams, fencing posts, &c.; rats will not touch woodwork treated by it. *See* advt. p. 7. Price, 1 gal., 5/–; 5 gallons	1	2	6
"**Antabane,**" for white ants, dry rot, &c., per gal. ..	0	3	6
Szerelaney, a stone liquid, waterproof and paste, ground in oil	1	3	6
Petrifying Liquid, colourless wash for hardening and waterproofing stone, brick, or cement work. For agent, *see* advt. p. 22. 12 gallons to cwt., per gal.	0	8	6
Marvelo Dry Oil Paint, per lb., 5d.; per barrel, per lb. ..	0	0	4
Bitumene Solution, 10 gallons = 1 cwt., said to cover 45 sq. ft., per gal.	0	4	0
B. & P. Paints and Compounds, all colours, and for different purposes, per gal., from	0	6	0
Creosote Paint, for preserving wood, per gal. *See* advt. p. 22.	0	8	0

DEE'S RUST PREVENTER.

For coating Steel, Iron, and other Metals.

Preserves colouring, if painted work; keeps polished surfaces bright. One gallon said to cover 600 sq. ft. rough work, 1000 sq. ft. smooth.

Treating Fibrous Cement and Concrete Surfaces.

Fibrous Plaster or **Fibrous Cement.**—First coat silicate of soda, 10 parts to 1 water after the material is thoroughly dry.

Economical Method of treating fresh Concrete before painting to neutralise the alkalies of the cement.—Mix equal parts in weight of zinc sulphate and water; this mixture changes the caustic lime to calcium sulphate or gypsum.

PAINTERS' WORK.

(Material as on page 218).

Labour at 1/4½ per hour.

Covering Plain Surfaces of Wrought Wood, Iron, in common colours, such as lead, stone, white, black, brown, chocolate, &c., including knotting and stopping.

Per square yard.

	Material.	Labour.	Total.
	s. d.	s. d.	s. d.
One coat in oil	0 3	0 4	0 7
Two coats in oil	0 5	0 6	0 11
Three coats in oil	0 7	0 8	1 3
Four coats in oil	0 9	0 9	1 6
Flatting, one coat, extra	0 2	0 3	0 5
Every additional coat add	0 2	0 3	0 5
Cleaning down and rubbing off old work			0 7
Eaves, Gutters, and Downpipe—	1 coat.	2 coats.	3 coats.
Up to 9in. wide, per yard run	0 2	0 3	0 4
Ornamental Iron Cresting, to 9in. wide	0 2½	0 4	0 6½
Ornamental Railings and Gates, &c., super.	0 4	0 8	1 0

Work executed off ladders, add 10 per cent.

Close Picket Fencing, reckon 50 per cent. on plain work.

Close Lattice Work, reckon double measurement.

PAINTING AND GENERAL SUMMARY (Knotting not included).

Labour and Material, per sup. yard.

	Each coat.
	s. d.
Painting and Stopping (large surfaces) on weather boarding, &c.	
2 coats	0 10
Ditto do. do. do. 3 coats	1 2
Ditto do. do. do. 4 coats	1 4
Ditto do. do. do. 3 coats and flatted	1 6
Varnishing, 2 coats, ordinary, and sizing	1 1
Ditto best varnish	1 6
Running, ¼ to 1½ lines, any colour, per ft. run	0 2
Ditto do. do. in Duresco, per ft. run	0 1½
French Polishing, handrails, per ft. run	0 6½
Fine Distemper Kalsomining, Alabastine, Arabic, per yard	0 3
Duresco, or similar finishing, coat stippled, per yard	0 7
Distemper, ordinary, any tint	0 3
Lime Washing, per coat	0 1½
Wood Preserving Oil, at 1/6 per gal.; per coat, per yard	0 1
Cleaning down and rubbing off old work, per yard 2d. to	0 4
Burning off and preparing old work, per yard	0 9½
Frosting Glass, per sq. yard	2 0
"Flogging" in oil prime imitation teak	0 7
Staining on pine	0 2
Ditto and sizing in one coat	0 5
Staining, sizing, varnishing, 1 coat	1 1½
Ditto, varnishing, 2 coats	1 4

If wages or materials alter in price reckon by percentage.

VARNISHING.	Materials.	Labour.
	s. d.	s. d.
Spirit varnish, each coat, per yard	0 5	0 2
Varnishing once in best copal, per yard	0 7	0 2
Ditto, twice do.	0 9	0 4
For every additional coat, add	0 3	0 2
FRENCH POLISHING.		
French polishing, per foot super.	0 1	0 5
Ditto to columns fluted, per foot super.	0 2	1 0
Ditto, to handrails and small articles, per foot run ..	0 1	0 6
Copal Varnish, per gallon	12 0	
Polish, per gallon	11 0	

Before varnishing the pores of the wood are filled with white size. For superior work after sizing the surface is either sand-papered or rubbed over with pulverised pumice-stone, which gives an even face and fills up the pores of the wood. The best French polish is mixed and rubbed in with finely powdered pumice stone.

White Dermar Varnish is colourless, and looks as well as French polishing.

SPECIAL PAINTER'S WORK.

Per yard super.

Items to be added to ordinary prices.

	Materials.	Labour.
	s. d.	s. d.
Finishing coat in party colours	0 1½	0 1½
Flatting coat or sanding, each	0 2½	0 3
Grounds for imitations, graining, &c.	0 2	0 2
Lilac, peach blossom, fawn or salmon	0 2½	..
Olive green, deep blue, or Indian red	0 4	..
Patent green, or yellow, and blue verditer ..	0 5	..
Lake or Chinese vermillion	1 0	..
Imitation granite, or splashed work	0 4	0 3

Plain Mouldings or Skirtings, Reveals, etc.

Less than 12 *inches girt or width.*

Per lineal yard.

	Materials.	Labour.
	s. d.	s. d.
Once in oil, common colours, as above, including knotting and stopping	0 1	0 2
Twice in oil do.	0 2	0 3
Three times in oil do.	0 3	0 4
Flatting coat do.	0 1	0 1
For every extra coat add	0 1	0 1

Enriched or Carved Work.

Per foot super.

Labour at 1/6 per hour.

	Materials.	Labour.
	s. d.	s. d.
Once in oil, common colours, as above	0 1	0 1
Twice in oil do.	0 1½	0 2
Three times in oil do.	0 2	0 3
For every extra coat ditto, add	0 0½	0 1
Flatting coat, add	0 0¾	0 1

If wages or materials alter in price add or deduct.

LINES AND SHADOWS.

Mouldings, or edges, cut in common colours ..	0 0½	0 1
Mouldings picked in, or black lines	0 0½	0 1½
Broad ebony lines, to form panels	0 0½	0 2
Light and shadowed lines, ditto	0 1	0 3
Plain chimney-pieces, each once in oil	0 6	1 0
Ditto do. ,, twice in oil	1 6	1 6
Ditto do. ,, thrice in oil	1 6	2 0

GILDING.

	Materials.	Labour.
Gilding plain work in oil gold, including preparing, per foot super.	2 0	3 0
Ditto in burnished or matt gold	2 0	4 6
Bronze mouldings, not exceeding 2in. girt, per ft. run	0 2	0 3
Old gold, ¼in. girth, ditto	0 1	0 3
Ditto ¾in. girth, ditto	0 1½	0 3
Ditto 1in. girth, ditto	0 2	0 4½
For every ¼in. girth add	0 0½	0 1½

Carved work, once and a half to twice the above prices. The present wages of Gilders are 1/4 per hour; bronze, 6/– per lb.; book gold leaf, 1/3.

GRAINING, &c.

	Per yard super.	Complete. s. d.
Plain oak, combed and shadowed		1 6
Mahogany, maple, cedar, or sycamore		1 9
Satin wood, coromandel, rosewood, bird's eye, maple, pollard oak, or Huon pine		2 3
Yew tree, amboyna, or walnut		2 9
Veined Marbling, including white ground		2 3
Dove, bardilla, or black and gold		3 0
Sienna, brocotella, rouge royal, or green verd		4 0
Venetian, French, or Devonshire		5 0
Lapis Lazuli, or blue and gold		6 0

If to carved work or to columns, add one-half the above prices; if to fluted columns, double them.

WRITING COMPLETE.

	Per letter per inch in height.	s. d.
Plain painted letters, 1 to 4in.		0 1
Ditto 4 to 8in. high		0 0¾
Ditto 8in. and over		0 0½
Egyptian or sunk letters		0 2
Gold, plain or bronze, with gilt edges or colour		0 4
Ditto, Egyptian or sunk		0 5
If shaded, add ½d., if double shaded		0 1
If to imitate projecting letters, add		0 2
Writing on glass, plain burnished gold, with two shades, on coloured ground		0 5
Ditto, with three shades, ditto		0 7
Embossing and gilding ornamental letters with two shades on coloured ground		1 4

For German text, old English, ornamental or ancient writing, add 50 per cent. to the above.

RECIPES.

Japan Black for Leather.—Burnt umber, 4ozs. ; true asphaltum, 2ozs. ; boiled oil, 2 quarts. Dissolve the asphaltum by heat in a little of the oil, add the burnt umber (ground in oil) and the remainder of the oil ; mix, cool, and thin with turpentine.

Mahogany Varnish.—Gum amm., 8lbs. ; clarified oil, 3 gal. ; litharge and powdered dry sugar of lead, of each ½lb. Proceed as for body varnishes, and thin with oil of turpentine, 5 gal., or a sufficient quantity.

Turpentine Varnish.—Put 1 pint of turpentine into a bottle with 1½lbs. of white resin in powder. Dissolve in a gentle heat by placing the bottle in an iron pot surrounded by dry sand over a moderate fire.

A Cheap Oak Varnish.—2 quarts of boiled oil, 1½lbs. of litharge, ¾lb. gum shellac. All boiled together and stirred up till dissolved, then take off the fire and add 2 quarts of turps ; when settled strain into a bottle and cork up for use.

Glass Cement Recipe, adhesive for glass or platter.—India rubber dissolved in gum mastic and glue, add half gelatine and isinglass. Melt together and thin with spirits.

Paint for Rough Woodwork.—6lbs. melted pitch, 1lb. linseed oil, and 1lb. yellow ochre.

How to Kill Grease Spots.—Before painting wash over smokey or greasy parts with saltpetre or very thin lime whitewash ; if soapsuds are used they must be washed off thoroughly as they prevent the paint from drying.

To Cover Fibro Cement with a cold water paint add petrifying liquid with each coat.

SUNDRIES.

Tarring.—One gallon of tar with 1lb. pitch will cover one square, or 11 super yards.

Caulking.—1 cwt. of oakum will do 700 lineal feet of seams in 2½in. planking, but on good work, with fine seams, half this quantity will suffice.

Chunam.—1 bushel fine sifted lime and 2 gallons best thin black oil, well mixed together, will be found a cheap and effectual substitute for white lead in T. & G. flooring for verandahs, &c.

To prevent the paint or galvanised iron from flaking dissolve copper chloride, copper nitrate, and sal ammoniac, ½oz. each ; when dissolved add ½oz. hydrochloric acid to 1 gal. of water.

Methods of Colouring Copper by oxidising the surface.—Make a paste of iron oxide and Graphite with wood alcohol ; heat in oven ; the colour obtained will depend on the amount of iron oxide mixed and the time of heating ; protect the colour obtained with varnish or lacquer.

Brown colours are obtained by using a mixture of verdigris, sal ammoniac, 2 to 3 pints to 1 of vinegar ; heat in oven.

Blue-black and **Blue-grey** colours may be given to copper by dipping in hot "liver of sulphur" solution and thoroughly dipping or scratch brushing, again dipping and washing.

To make **glue waterproof** add a little bromate of potash to the water.

Another method : Dissolve glue in linseed oil over a slow fire.

A TABLE OF OIL MEASURE.

At 91lbs. to the gallon.

Per cwt. £	s.	d.	Per gal. s.	d.	Per cwt. £	s.	d.	Per gal. s.	d.	Per cwt. £	s.	d.	Per gal. s.	d.	Per cwt. £	s.	d.	Per gal. s.	d.
0	18	2	1	5½	1	7	6	2	2½	1	17	4	3	0	2	6	8	3	9
0	18	8	1	6	1	8	0	2	3	1	17	10	3	0½	2	7	2	3	9½
0	19	2	1	6½	1	8	6	2	3½	1	18	4¼	3	1	2	7	8¼	3	10
0	19	8¼	1	7	1	9	0¼	2	4	1	18	10½	3	1½	2	8	2½	3	10½
1	0	2½	1	7½	1	9	6½	2	4½	1	19	4¾	3	2	2	8	8¾	3	11
1	0	8¾	1	8	1	10	0¾	2	5	1	19	11	3	2½	2	9	3	3	11½
1	1	3	1	8½	1	10	7	2	5½	2	0	5¼	3	3	2	9	9¼	4	0
1	1	9¼	1	9	1	11	1¼	2	6	2	0	11½	3	3½	2	10	3½	4	0½
2	2	3½	1	9½	1	11	7½	2	6½	2	1	5¾	3	4	2	10	9¾	4	1
2	2	9¾	1	10	1	12	1¾	2	7	2	2	0	3	4½	2	11	4	4	1½
1	3	4	1	10½	1	12	8	2	7½	2	2	6¼	3	5	2	11	10¼	4	2
1	3	10¼	1	11	1	13	2¼	2	8	2	3	0½	3	5½	2	12	4½	4	2½
1	4	4½	1	11½	1	12	8½	2	8½	2	3	6¾	3	6	2	1	10¾	4	3
1	4	10¾	2	0	1	14	2¾	2	9	2	4	1	3	6½	2	13	5	4	3½
1	5	5	2	0½	1	14	9	2	9½	2	4	7¼	3	7	2	13	11¼	4	4
1	5	11¼	2	1	1	15	3¼	2	10	2	5	1½	3	7½	2	14	5½	4	4½
1	6	5½	2	1½	1	15	9½	2	10½	2	5	7¾	3	8	2	14	11¾	4	5
1	6	11¾	2	2	1	16	3¾	2	11	2	6	2	3	8½	2	15	6	4	5½

A TABLE OF TURPENTINE MEASURE.

8lbs. 10ozs. to the gallon.

Per cwt. £	s.	d.	Per gal. s.	d.	Per cwt. £	s.	d.	Per gal. s.	d.	Per cwt. £	s.	d.	Per gal. s.	d.	Per cwt. £	s.	d.	Per gal. s.	d.
1	6	0	2	0	1	16	0	2	9	2	6	0	3	6	2	16	0	4	4
1	7	0	2	1	1	17	0	2	10	2	7	0	3	7	2	17	0	4	4½
1	8	0	2	2	1	18	0	2	11	2	8	0	3	8	2	18	0	4	5½
1	9	0	2	2½	1	19	0	3	0	2	9	0	3	9	2	19	0	4	6½
1	10	0	2	3½	2	0	0	3	1	2	10	0	3	10	3	0	0	4	7
1	11	0	2	4½	2	1	0	3	2	2	11	0	3	11	3	1	0	4	8
1	12	0	2	5½	2	2	0	3	3	2	12	0	4	0	3	2	0	4	9
1	13	0	2	6½	2	3	0	3	3½	2	13	0	4	1	3	3	0	4	10
1	14	0	2	7½	2	4	0	3	4½	2	14	0	4	2	3	4	0	4	11
1	15	0	2	8	2	5	0	3	5	2	15	0	4	3	3	5	0	5	0

DURABLE WHITEWASH.

(American Congress Recipe).

Used on "White House," Washington.

Slack ½ bushel of unslacked lime with boiling water, covered to keep in steam. Strain through fine sieve. Add a peck of salt previously dissolved in warm water; 3lbs. ground rice, boiled to a thin consistency; ½lb. powdered whiting; 1lb. of clean glue, previously dissolved. Boil the mixture for an hour in a small kettle inside another.

Then add 5 gals. of hot water, stir it well, stand for a few days, and put on hot with fine or coarse brush, according to finish required. It remains brilliant for many years. Colouring matter may be added if desired. 1 pint covers 1 yard.

RECIPES.

GOOD ROUGH PAINT FOR ROOFS AND OUTBUILDINGS.

Mix slowly 1 gal. crude petroleum with 3lbs. brown metallic. Thin down with a little coal oil. Apply as ordinary paint.

TO CLEAN PAINT WITHOUT DETERIORATING OR AFFECTING SAME.

Dip a piece of flannel or felt in hot water and powdered whiting and apply briskly.

Hot water and ammonia, a tablespoonful to a quart, wiped over surface to remove grease and dirt.

WHITEWASH.

2lbs. sulphate of zinc, 1lb. salt to ½ bushel of lime, will adhere firmly on wood or galvanised iron, forming a cooling covering.

COLOURED WASHES.

1 bushel of lime, 4lbs. yellow ochre, makes good cream colour.

2lbs. Indian red, 7lbs. amber, 2lbs. lamp black, makes good fawn colour.

7lbs. raw umber, 4lbs. lamp black, makes good buff stone colour.

CLEANING DOWN, &c.

Remove splashes from windows.—Hot solution of soda and water.

Remove splashes from floors.—Use turpentine.

To remove Paint or Varnish from woodwork or machinery—

(1) Dissolve 1lb. of potash in a gallon of water and apply with an old mop.

(2) Let it remain for ten minutes, when the paint will wash off.

(3) The addition of a little hot lime is an improvement.

To stain wood Mahogany.—If soft wood is washed with a solution of nitric acid it will take on a brown stain having the appearance of mahogany.

TO REMOVE PAINT FROM BRICK WALLS.

Dissolve 10lbs. of caustic soda or saponified lye in 5 gal. of water, and stir into the solution 5 quarts mineral oil; add enough sifted sawdust to make a paste. Plaster this thickly on the old paint, and in a few hours scrape off the dissolved substance. To repaint the wall, clean with water, and a coat of vinegar to neutralise the alkali that may have remained in the pores of the brickwork.

Or another: Slake in one vessel a quantity of lime, and in another vessel dissolve same weight of soda ash, leaving overnight. Mix both together next day, adding enough whiting to make a paste, and apply this to the old paint. Well rinse the wall when the paint has been removed, apply a coat of vinegar before repainting.

When **red bricks** of a fireplace become **discoloured** with soot or otherwise, rub with brickyard dust paste; or paint the bricks with boiled linseed oil all they will absorb. This treatment may be repeated if the bricks are much discoloured.

PAPER HANGER.

This trade has been almost revolutionised during the last five years, the old tawdry papers giving place to the thoroughly artistic. Entirely new materials and designs are now employed for wall decoration.

A piece of paper is 36 feet long by 21 inches wide, and contains 63 sup. feet, or 7 sup. yards, but the ends are generally injured by packing, exposure, unrolling, &c. ; in papering there is also a further waste in matching the ends according to the size of the pattern ; an allowance must therefore be made from 5 to 9 super. feet, in calculating the number of pieces required for a given area, after deducting the openings. Any portion of a piece required is charged as a whole piece.

TABLE FOR MEASURING ROOMS FOR PAPER.

Measure Round the Walls in Feet. Including Doors, Windows, &c., and not exceeding these measures.

Height in Feet.	20	24	28	32	36	40	44	48	52	56	60	64	68	72
7½ and under 8	3	3	4	4	5	5	6	6	7	8	8	9	9	10
8 ,, 8½	3	3	4	5	5	6	6	7	7	8	8	9	9	10
8½ ,, 9	3	4	4	5	5	6	7	7	8	8	9	9	10	11
9 ,, 9½	3	4	4	5	6	6	7	7	8	9	9	10	10	12
9½ ,, 10	3	4	5	5	6	7	7	8	9	9	10	10	11	12
10 ,, 10½	4	4	5	5	6	7	8	8	9	10	10	11	12	13
10½ ,, 11	4	4	5	6	7	7	8	9	9	10	11	11	12	13
11 ,, 11½	4	5	5	6	7	8	8	9	10	10	11	12	13	14
11½ ,, 12	4	5	6	6	7	8	8	9	10	11	12	12	13	14
12 ,, 12½	4	5	6	7	7	8	9	9	10	11	12	13	14	15
12½ ,, 13	4	5	6	7	8	8	9	10	11	12	13	14	14	15
13 ,, 13½	5	5	6	7	8	9	10	11	11	12	13	14	15	16
13½ ,, 14	5	5	6	7	8	9	10	11	12	13	14	14	15	16
14 ,, 14½	5	6	7	8	9	9	10	11	12	13	14	15	16	17
14½ ,, 15	5	6	7	8	9	10	11	12	13	14	14	15	16	17

Rule.—Find the height of the room between the skirting and cornice in the left hand column, and the nearest Figures to the measures round the Walls on the top line ; the figures where the two the lines would cross or meet will show the number of pieces a room will take.

To find the quantity of Paper required for Ceilings, multiply the length and breadth in feet together, and divide by 50.

Wages of Paperhanger, per day, 9/– to 10/–. For Special Work, 10/– to 11/–.

	Material. Per roll. From		To		Labour. Per roll. From		To	
	s.	d.	s.	d.	s.	d.	s.	d.
Ordinary machine printed pulps ..	0	4½	1	3	0	6	1	0
Lining Paper	0	5	1	0	0	6	1	0
Ditto, stout, 30in. wide	1	0	1	6	0	6	1	0
Common pulps on self-coloured paper	0	6	0	9	0	9	1	0
Papers—								
White or coloured, prepared grounds	0	9	1	6	0	9	1	0
Satin, prepared grounds	1	0	3	0	0	10	1	6
Dark and light pulps, floral or geometrical designs	0	5	0	8				
Sanitary wall paper	0	7	1	6	1	0	1	3
Can be washed when soiled, ceiling paper					1	0	1	3
Floral and other patterns, best white pulp, machine	0	9			0	9	1	6
Ditto, hand made	2	6			1	6	2	3
Gold papering, &c.	0	10						
Ditto, figured grounds	1	6	4	6	1	0	2	0
Figured satin papers	2	0	12	6	1	6	3	0
Ditto do handmade	7	0	20	0	2	0	3	6
Plain or decorated ingrained papers, for fillings, all shades	2	6	7	6	1	6	2	0
Plain crepes, heavy paper, all colours, double rolls, 30in. wide x 16 yds. long	5	6	8	6	1	6	2	0
Ditto do. bright red	8	0			1	6	2	0
Ceiling papers	0	6	3	0	1	0		
Damp-proof papers, for damp walls	1	0			0	6	0	10
Borders, to match all papers, 3in., 5in., 7in. to 10in. wide					0	9	2	6
Friezes, borders, 18in., 21in. wide per yard	1	3	3	0	0	9	2	6
Friezes, borders, used with plain ingrains or stripes, 10in. per yard	0	6	1	0	0	3	1	6
Special Papers								
Leatherettes, 12 yards long, per roll	5	6	7	6	2	0	3	0
Leathers, 22in. wide, per yard	0	10½	3	0	2	0	3	0
Rough cast, all colours, per roll	5	6	12	0	0	10	2	0
Pebbles, all colours, from ..	4	0	6	6	0	10	2	0
Burlap's, imitation canvas, all colours,	3	6	5	6	1	6	2	0
Silks, ribbed (brocatives), ..	6	6	10	6	1	6	2	0

Sanatile, waterproof enamelled canvas, in ornamental tile patterns and colours.

For Dadoes, walls of bath-rooms, lavatories, saloons, cars, per sq. yard 2/6, **labour fixing** 1 6 2 0

If wages or materials alter in prices add or deduct,

(*See advt. page* 22).

Labour, per piece only.	From s. d.	To s. d.
Straining canvas, including tacks and slipping ..	0 9	1 3
Hanging lining paper	0 6	1 0
Ditto common or satin paper	0 6	1 0
Ditto flock	1 0	1 6
Pumicing lining paper	0 2	0 3
Hanging borders, per doz. yards	0 9	1 3
Plain crepes	1 0	1 6
Sizing, 2 coats, and varnishing paper	1 6	2 6
Ditto do. and twice varnishing	2 0	0 3
Extras.		
Hanging horizontal papers	0 2	0 3
Tinting and Bronzing—		
Relief paper, tinting and bronzing, per yard ..	0 6	2 0
Ditto bronzing	1 6	2 6
Ditto in colours		
Hanging ingrain borders, 12in. to 18in., per yard ..	0 2	
Ditto, "Lignomur," "Anaglypta," &c., per panel ..	0 6	2 6
Ditto do. do. fillings, per yard	0 3	1 6
Ditto do. do. mouldings, run yard	0 2	0 8

For superior decorations no prices can be quoted, since the cost of hanging entirely depends on the design and the number, size, and shape of the panels.

Ridgeley's "Ideal" **Trimmer,** for common or special papers. This cutter trims "Anaglypta," and other raised material. Price for outfit, complete :—6ft., 22/– ; 7ft., 25/– ; 8ft., 27/– ; 9ft., 29/–.

GLAZING SASHES.

The average prices, for labour only,

Glazing sashes including priming (wages at 1/3)—	Per light. From s. d.	To s. d.
10in. x 14in. and under	0 2½	0 3
10in. x 16in. ,, ...	0 5	0 6
14in. x 24in. ,, ...	0 7	0 9
24in. x 30in. ,, ...	0 10	1 0
36in. x 40in. ,, ...	1 3	2 1

PASTES.

Paste for Papering Painted Work.

Mix the flour and water thinner ; to each gallon add 1oz. resin. For Sanatile or stiff paper add glue or size.

Labelling Paste for Tin.

Mix stiff paste of flour and water, 1 gal. ; add 2oz. tartaric acid, 1 pint treacle. Boil stiff, preserve with ¼oz., or 10 drops.

Paste for Paper to Iron or Metal.

Boil dextrine and water to consistency of very thin glue. Remove all traces of grease or oil with limewash previously.

Anaglypta and Salamander is a moulded pulp relief material, white, for inside decoration, for walls, ceilings, friezes and dadoes. Closely resembles the best of plaster and wood mouldings, and are lighter and cheaper—

	From s. d.	To s. d.
Ceiling and Wall fillings, in rolls, 21in. x 12 yds., per yard	1 0	2 0
Ceiling Panels, 2ft. x 2ft., per panel	2 6	
Dado Panels, 3ft. x 2ft. wide, per panel	1 9	5 0
Dado Rollers, per lin. yard	1 0	

Prices of above according to relief.

Muraline.—A patent wall decoration, 24in. wide x 12 yards long, per piece 4 0 18 0

Printed in oils, embossed, per yard run 3 6

Hanging, per yard 0 4

Lignomur.—A perfectly white finished material for relief decoration. The lightness and readiness with which it adheres and joins renders it a very acceptable and artistic method for bas-relief papering. Like "Anaglypta" and "Salamander," it lends itself to any style of internal ceil and wall decoration. Can be tinted in shades, or in variegated coloured bronzes. Prices similar to "Anaglypta."

Labour price, fixing, according to design, per panel, from 0 6 2 6

Cross battoning, if required, extra.

Strong canvas, per yard, 6d. ; sewing same, per yard, 1d. ; Tacks, per 1000, 9d. ; double size, per lb., 4d.

Use the pure flour and water paste, no alum, just mixed, but cool, so as not to injure the colouring.

Hanging Plain Tinted Papers.—White lining papers should be laid first, especially under red. On no account let papers soak with too much paste, as shrinkage and alteration of tint will occur. Reverse papers every other length to get uniform tint.

"GLAZIER."

Transparent window decoration,

Imitation stained glass—Per dozen.

	From s. d.	To s. d.
Borders, 18in. long, 1in., 3in., 3½in., 4in. and 5in. wide, with mitre pieces	1 0	7 0
Centre Pieces, 24in. x 12in. and 20in. x 14½in. 28in. x 18in., 15in. x 13½in., 18in. x 8in., 12in. x 12in., 22in. x 9in., 22in. x 8in., figures	18 0	36 0
Centre Pieces, floral fonds 20in. x 15in., in lead light	10 0	30 0
Ground Patterns, 20in. x 14½in., 20in. x 15in., lead light, plain and ornamental	5 0	12 0

Labour, fixing same, from 2d. per sq. foot.

WHITE ANT EXTERMINATOR AND INSECT DESTROYER.

One of the simplest and most effective ; used as a spray. Mix—arsenate of soda, 1lb. ; warm water, 4 gal., by adding molasses the insects become cannibalistic and eat each other.

PLASTERER.

MEASUREMENT.

In **Measuring Plastering** a variety of opinions exist, all of them tending more or less to misunderstanding, and consequent litigation.

The least objectionable method is to take the *net measurement* at a price calculated to meet the cost of the work under consideration, including all extras.

Walls and ceilings by the super yard.

Cornices and mouldings by the running foot, per inch girth.

Ordinary openings with 4½in. reveals are not deducted.

The price for 4½in. reveals in Portland cement is about 4d. per lin. foot. Taking a 6ft. x 3ft. window, the reveals will cost 5/–, which is also the cost of 2 super yards of cement stucco.

The weathering of cornices to be taken as plain work.

Panels, mitres, returns, columns, caps and bases, balusters, dentil blocks, and patterns, &c., so much each, according to dimensions.

Narrow widths, dadoes, skirtings, &c., kept separate and reckoned by the lin. ft.

Rough cast, lined work, projecting quoins, basecourses, kept separate and reckoned accordingly.

Or priced extra on plain body work, according to the cost of extra labour.

If circular, add one-fourth, if circular circular, as in domes or concentric arches, add one-half to each item.

Scaffolding to be charged extra, if erected expressly for the work.

In taking the height of walls for inside plastering measure down to *skirting grounds*.

If no grounds, then down to the floor, deducting all openings except for "labour only."

If more than 4 mitres in one room they are allowed for in measuring cornices.

MEMORANDA.

Portland Cement Stucco should be rendered and set, or *roughed* in and finished in two coats; the second, or setting coat, can be added before the first coat dries, otherwise it must be scored deeply to form "key" for following coat. In every case the walls should be watered before the stucco is applied; it is also necessary, if the cement is to become hard throughout, or properly set, that it be saturated with water daily, from 3 to 14 days, according to the heat of the weather, until there is no more suction, otherwise the cement stucco or plaster will merely have a hard surface, while the bulk remains a dry powder. Really good cements are often badly treated.

Porosity.—All exposed flat surfaces, or weatherings, should be set in 1 to 1 cement, the addition of sand makes it porous in proportion to the quantity used.

Plasterers' Putty for finishing coat of plaster work is lime dissolved in water, screened through hair sieve into boxes, allowed to settle and sweeten 7 days.

Gauged Stuff is made by mixing before use 3 to 4 parts of the above Putty with 1 part of Plaster of Paris.

(MEMORANDUM).

"**Floating,**" or first body coat of plaster, for internal walls only.

1¼ bags of stone lime, 1 cubic yard of sand will cover 50 super yards ½in. thick, or about 70 yards including general openings of cottages.

1 bag of stone lime run into **Putty** will "set" or finish coat 150 super yards.

"**Pricking up**" **Stuff**, body coat for ceilings, ¾in. thick—3 bags stone lime, 1 bag of cow's hair = about 2 bushels; mixed with 1 cubic yard sand will cover 100 square yards on Oregon sawn laths; or 1 bag lime, ½ cubic yard sand, ½ bushel hair will do 30 square yards on scrim, or 35 yards on laths alone.

If on expanded metal lathing it will take 4 bags of lime to cover 100 super yards.

If *scrim* is used 2½ bags of stone lime to the 100 yards.

Trowelling the surface should not be done too much as it causes fine cracks to appear when dry.

To prevent Plaster of Paris setting too quickly add sprinkled sugar or add acetic acid.

The tints used for the setting coats are generally French gray, drab, buff or salmon.

Special cold water paints, Kalsomines, Olsenas of all tints, can be applied safely after 6 months' drying, when the mellowed plaster will not affect or alter the tint.

COVERING POWER OF PLASTER.

Generally the mortar is reckoned at one-third stone lime and two-thirds clean sand, mixed with long ox hair—thickness, ¾in.

1 cubic yard contains 21 bushels.

1 cask of cement contains 3½ cubic feet.

6 casks to the cubic yard.

7/9th cubic ft. = 1 bushel.

Covering capacity of 1 bag 125lbs. Portland cement when mixed in the following proportions of sand—

Thickness	½in.	¾in.	1in.
Cement neat .. .. Square yards	2¾	2	1½
125lb. bag cement—1 to 1 sand ,,	4½	3⅓	2
,, ,, 1 to 2 ,, ,,	6	4¾	3
,, ,, 1 to 3 ,, ,,	8.6	6¼	4⅓
,, ,, 1 to 4 ,, ,,	10	8¾	5½
,, ,, 1 to 5 ,, ,,	13.4	10.	6¾

PLASTERERS' MATERIALS.
Subject to Fluctuation.

	Sydney. £ s. d.
Portland Cement, best brands, per cask	0 15 6
Ditto, Rock or Union brand, per bag 125lbs., each	0 5 6
Rock Wall Plaster, per cask	0 16 6
Asbestic Plaster Cement, per cwt., in bags	14/– to 1 0 0
Keen's Cement, per cask	1 13 0
Stone Lime, per bag, 3 bushels	0 5 0
Shell Lime, per bag, 3 bushels	0 4 6
Plaster of Paris, per cask, 3½ bushels	0 17 6
Sawn Oregon Laths, 4ft. 6in. x 1¼in., per 10 bundles, 35/–; per bundle	0 4 6
"Herringbone" Expanded Steel Lathing	0 1 7
Yellow Sydney Sand, per load, 23 cubic ft.	0 4 0
White Sydney Sand, per load, 23 cubic ft.	0 3 6
Nepean River Coarse Sand, at railway, per ton	0 5 6
Hair, long cow's, per bushel, 1/8; 3 bushel bag	0 5 0

WALLS AND CEILINGS.
Rendering, Lathing, etc.

Wages 1/6 per hour.

Per super yard.	Materials. s. d.	Labour. s. d.	Total Cost. s. d.
Render or Plaster rough on walls	0 5	0 4	0 9
Ditto and set with fine stuff, 2 coats	0 7	0 8	1 3
Ditto, float, and set with tinted fine stuff (3 coats trowelled)	0 9	0 8	1 5
Lathing only, Oregon laths to partitions	0 7½	0 2½	0 10
,, and plaster, or lay one coat, do.	0 7	0 7	1 2
,, lay and set two coats do.	1 0	1 3	2 3
,, Expanded patent steel lathing partitions, floated	2 3	0 10	3 1
Expanded steel laths, lay, float and set to ceilings	2 3	0 11	3 2
If set with gauged putty, add	0 2	0 1	0 3
,, with plaster of Paris, add	0 4	0 2	0 6
Lath, lay, float, and set to jambs, friezes, or soffits, per super ft.	0 2	0 3	0 5
Render, float, and set to ditto do. do.	0 1	0 2	0 3

CORNICES, ETC., IN PLASTER OF PARIS.

Including lathing (if bracketted) or dubbing out.

Per foot run.	Materials. s. d.	Labour. s. d.
Plain impost or other mouldings, 4in. girt	0 2	0 3
Ditto, from 4 to 8in. girt	0 3	0 4
Ditto, from 8 to 12in. girt	0 4	0 6
Cornices, with soffit and frieze, the whole girt to be taken at per foot super	0 6	0 6

Enrichments, Centre Flowers, &c., *see* Index.

PORTLAND CEMENT STUCCO.

Per yard super.	Materials. s. d.	Labour. s. d.
Rough render, in cement	1 0	0 9
Plain face, on brick or stone, jointed	1 4	1 0
Ditto on lath including lathing	1 9	1 3
Rough cast, Bluestone	1 0	1 0
Cornices as before, per super ft.	0 4	0 8
Large skirting, per super ft.	0 4	0 6
Plain facia, frieze or pilasters, per super ft.	0 4	0 6
Astragals, ovolos, O.G.'s, and other mouldings, grooves or sinkings, under 4in. girt, per ft. run	0 1	0 3
Ditto, from 4 to 8in, per ft. run	0 2	0 4
Ditto, from 8 to 12in. girt, per foot run	0 3	5
4½in. reveals or margins, per ft. run	0 2	0 2
9in. do. do. do. do.	0 3	0 3

N.B.—The above prices for materials are reckoned at 5/ per bushel for Portland cement, and 6d. per bushel for clean-washed sand mixed in the proportion of 1 of cement to 3 of sand, and averaging ¾in. thick.

If 1 of cement and 2 of sand is required, add one-fourth to the price of the materials.

Mitres and stops in Plaster or Cement, cornices, reckon 1ft. extra.

STUCCO OR EXTERNAL PLASTERING.

Per super yard.	Materials. s. d.	Labour. s. d.
Bastard, or rough stone or hydraulic lime stucco, jointed on brick or stone walls	0 8	0 10
Ditto, on lath, including lathing	1 0	1 2
Trowelled stucco, on brick or stone	0 8	1 1
Ditto, on lath and lathing	1 0	1 5
Raised margins to form panels, 4in. wide moulded, per foot run	0 2	0 4
4½in. reveals to windows do. do.	0 1	0 2
9in. ditto do. do.	0 2	0 3

The above materials include stone or hydraulce lime, which is best adapted for stucco or external plastering.

ROUGH CAST CEMENT WORK.

Per square yard.	Materials. s. d.	Labour. s. d.	Total cost. s. d.
1 smooth coat and 1 cast coat breeze, ¾in. thick	1 0	1 0	2 0
Ditto do. do. Bluestone metal	1 4	1 2	2 6
Finishing coat, 1 to 2 cement to floors 1in. thick			2 6
Wire netting over laths, 2in. mesh, add extra			0 6
If double layer netting be used, add			1 0
Rough Cast Single Chimney, 18in. x 18in. x 10ft. high, including scaffold	7 0	10 0	

If wages or materials alter in price, add or deduct.

Material Required for ¾in. thickness of Compo.

Portland Cement Plastering—

1 bushel cement and 1 bushel sand will cover 3 sup. yards.
1 bushel cement and 1½ bushels of sand will cover 3¾ sup. yards.
1 bushel cement and 2 of sand, 4½ sup. yards.
1 bushel cement and 3 of sand, 6 sup. yards.
1 bushel cement and 4 of sand, 7½ sup. yards.

N.B.—By adding ½ to the number of sup. yards, the area at ½in. thick, or deducting one-third, the area at 1in. may be obtained.

Covering Power of Cement Stucco.

1 cask of Cement = 3½ cubic ft., and 2 casks of sand 7 cubic ft. When mixed will form about 9 cubic ft. (as 1½ cubic ft. being taken up by voids of sand) and will cover—

12	super yards	1 inch thick.
18	,, ,,	¾ ,, ,,
24	,, ,,	½ ,, ,,

Labour.—One man will float and finish 18 square yards per day, or average 28 yards per hour ¾in. thick.

Body coat of cement usually 1 to 2½. Finishing coat, 1 to 1. Facing only, 1 to 1.

CURRENT CONTRACT PRICES.

Materials, Labour and Profit.	Per sup. yd. s.	d.
Float and set on brickwork	1	3
Render and set with laths (wood)	2	3
Ceilings, lath, float, scrim and set	2	6
Render and set with metal lathing	3	9
Cement Rendering, ½in. thick steel trowelled on brickwork	1	5
,, ,, ¾in. ,, ,,	2	0
,, ,, 1in. ,, ,,	2	4
Extra if finished in Keene's Cement, if 100 yards or over	1	6
,, ,, ,, if less than 100 yards	1	3
	Per ft. run.	
Mouldings and Cornices, 1in. Plaster, per inch girt	0	1
,, ,, ,, Cement, per inch girt	0	1¾
,, ,, ,, Keene's Cement per inch girt	0	2½

CENTERING.

Per square yard.	s.	d.
For Concrete Floors, Roofs, including strutting, fixing and removing	1	6
For Concrete Walls	1	4
Narrow widths under 2ft. wide, per foot super	0	4
For Concrete Walls	1	4
Narrow widths under 2ft. wide, per foot super	0	4
Ditto do. do. 1ft. do. do.	0	6
Extra if wrought face and close jointed, per yard	0	6
Small narrow Mould Boards, under 9in. wide, forming reveals, corners, per foot run	0	3

KEENE'S CEMENT.

70lbs. — ¼ cask Keene's cement (280lbs. per cask) will cover about 13 square yards ⅛in. thick on Portland cement ground.

70lbs. of Keene's Cement and 2 cwt. of sand for coring will cover 15 square yards ⅛in. thick. Allow 12 gals. of water for latter quantity.

Labour.—One man can finish 10 yards, ⅛in. thick, in 6 hours.

KEENE'S CEMENT WORK.

Dubbed out with Cement Compo.	Materials.	Labour.
Per yard super.	s. d.	s. d.
Superfine cement trowelled on brick or stone	2 6	1 3
Ditto, on lath, including lathing	3 0	1 6
Panels moulded (small)..	0 7	0 9
Per foot super.		
Facias, jambs, pilasters, architraves	0 5	0 7
Plain mouldings, medium cement	0 9	0 11
Ditto, skirtings, 9 to 18in. high, with 3in. moulded, or sunk and moulded	0 9	0 9
Superfine cement, plain faced and polished ..	0 9	1 0
Superfine cement, plain mouldings	1 0	1 0
Superfine cement, polished buff	1 1	1 2
Ditto do. green or blue	1 6	1 3

If circular, as in columns, groins, &c., add one-third.

The above items are reckoned to contain one-third Keene's cement to two-thirds clean, sharp sand, and plain work to average ¾in. thick.

LIME WHITE, WHITEWASHING, &c.

Per super yard.	Labour.
	s. d.
Lime white, per coat (lime and water)	0 1½
Ditto, two coats do.	0 2
Wash, stop, and white-washing with whiting and size to old work	0 4
Ditto, to old ceilings	0 5
Plain cornice washed, stopped and whited, per foot super, with whiting and size—one coat, 2d. ; two coats	0 3

Half a bushel of quick lime is required for 70 super yards of lime-white, one coat. 12lbs. whiting, ½lb. blue black, and 7 quarts size will do the same quantity of white-wash, equal to 40 s. yds. per gal.

Cement stucco or plaster is often coloured with lime white, mixed with about one-fifteenth the quantity of raw linseed oil ; black oil or common tallow will do if mixed hot or during the slaking of the stone lime.

One gallon will cover from 35 to 40 sup. yards one coat, or about 28 sup. yards two coats.

Although nearly waterproof, it will seldom withstand continuous driving rain on exposed walls.

See Waterproof Mixtures page.

LATHING.

Where space and weight are a consideration, thin, light and solid partitions on Steel Lathing can be used and fastened to ¼in. or ⅜in. W.I. vertical rods, spaced about 1 foot apart, tautly fixed and hooked into eye bolts screwed into ceiling and floor joists; plastered on both sides with a finished thickness of 2in., forms a very light, yet exceedingly strong, rigid, and practically fire and vermin proof wall, the combined steel and plaster work forming a monolithic slab able to withstand any reasonable pressure or thrust, in partitions from 14ft. to 16ft. high. In hollow partitions, the lathing may be similarly used on wood studs or angle steel, using two layers of the lathing, and plastered on the outside only.

Two bundles of 4ft. 6in. x 1¼in. Oregon laths will cover 11 sq. yards or 100 sq. feet.

	s.	d.
No. 1, **Expanded "Diamond"** Mesh Lathing, ⅜in. mesh x 24G., in sheets6ft. x 2ft. and 7ft. 6in. x 2ft., 8ft. x1ft. 3in., per super yard	1	6

Diamond Mesh.

	s.	d.
No. 84, **Expanded "Cup"** Lathing for Stud Work, ⅜in. mesh, 24G., in sheets 7ft. 8in. x 1ft. 8in., per super yard ..	1	4
No. 201, **Square Mesh** Lathing, ⅜in. mesh, 27G., for Girder Work, per super yard	1	2
Diamond Mesh, 22G	1	7
,, ,, 25G	1	3
,, ,, 27G	1	6
Nos. 64 and 39 (smaller gauge), **Diamond** Mesh Lathings are used for ripples in gold saving or concentration tables.		
Labour, fixing to ceilings, 6d.; walls, 4d.; to partitions and rods, per super yard .. .. .. 9d. to	1	0

	s.	d.
Herringbone Expanded Steel Lathing, in sheets 90 x 80, packed 15 sheets in a bundle, per square yard	1	4
Memel Lathing, punched steel sheet lathing	1	2

Herringbone Expanded Steel Lathing.

	s.	d.
Interlocking Lathing, a perforated thin steel sheet, with the "lugs" of perforation left on and projecting to form key for plaster	1	0
Labour, fixing per yard super, walls ..	0	4
Labour, fixing per yard super, ceilings ..	0	6

FIBROUS PLASTER.

FIBROUS PLASTER CEILINGS AND CORNICES.

The demand for this class of work has increased to a wonderful extent of late years.

Its peculiar adaptability for all classes of building, the beauty and variety of designs; its wonderful fire-resisting qualities, and the facility with which it can be forwarded to any part of the Commonwealth have brought it very much into prominence.

	Subject to Trade Discounts.	Fixed
Partition Wall Blocks, 2½in. thick, per yard	5 6	
Ditto do. do. fixed and finished both sides, per yd,		7 6
Ditto, 4½in. thick, per yard	8 6	
Ditto do. fixed and finished both sides, per yd.		10 6

PANELS.

Ceiling, Plain Panels, per yard, from	2 6	5 0
Plain Panels, with cover mouldings, from per yard ..	2 9	
Ditto, fixed with gal. clouts on 3 x ½ battens, finished		5 0
Ornamental Panels, f.o.b. Sydney, per yard, from ..	3 0	

CORNICES.

	Per ft. run.	Fixed.
Cornices, 2½in. from	0 2	
„ 4 x 3¼	0 6	0 8
„ 7½ x 6	1 0	1 3
„ 8 x 6	1 3	1 6
„ 9 x 8	1 3	1 6
„ 6 x 11	1 6	2 0
„ 10 x 10	2 0	2 6
„ 5 x 5½	0 9	1 0
„ 9 x 11	2 0	2 6
Friezes, 18in. deep, Ornamental	1 3	1 9
„ 20in. „	1 10	2 3

	£ s. d.
Capitals and **Columns** covering.	
Over doors, Over arches, and **Over mantels,** each, from	1 5 0
Corbels, cantilever brackets, from	0 2 6
Soffits of Beams and **Girders Casing**—	
Fixed, per ft. super	0 1 6
Firring not included.	
Soffits of stairs and spandrils, fixed, per yard, from ..	0 5 0

Victorite, a new plastering material made by Cafferata & Co., Newark-on-Trent, to be mixed with lime putty and washed sand, forming a cement surface of exceptional hardness and strength.

ENRICHMENTS.

Rope Enrichments, reinforced with cane, 2½in. dia., per ft. run ..	0 2
Plaster of Paris, **inside vents** 9in. x 6in., per doz.	6 0
Do., **bosses,** 4in., per doz.	0 9
Corner Angles for ceilings, each 12in. x 12in. perforated ..	1 0

See advt. page 32.

MODELLER, &c.

Labour, 13/– per day.

Items each.	Modelling.			Plaster Castings fixed.		
	£	s.	d.	£	s.	d.
Ionic capital, for 12in. column	4	0	0	1	12	0
Ditto 18in. column	6	0	0	2	0	0
Ditto 24in. column	8	0	0	3	0	0
Corinthian or Composite capital, for 12in. column	5	0	0	2	0	0
Ditto do. 18in. column	7	0	0	3	0	0
Ditto do. 24in. column	10	0	0	4	0	0
Pilasters the same as capitals, quarter pilasters, one-half.						
Modillion enriched, 4in. projection	1	0	0	0	1	6
Ditto 6in. projection	1	4	0	0	2	3
Ditto 8in. projection	1	12	0	0	3	0
Trusses enriched, 10in. x 5in.	1	4	0	0	5	0
Ditto 12in. x 6in.	1	8	0	0	6	0
Ditto 18in. x 9in.	2	0	0	0	9	0
Paterae or rosette, 4in. diam.	0	8	0	0	1	0
Ditto 8in. diam.	0	12	0	0	3	0
Centre or ceiling flower, 12in. diam.	1	4	0	0	2	6
Ditto 18in. diam.	1	12	0	0	4	0
Head on keystone, 12in. deep	0	18	0	0	10	0
Ditto 15in. deep	1	0	0	0	14	0
Ditto 18in. deep	1	4	0	0	18	0
Acanthus, or lotus leaf, 8in. high	0	12	0	0	2	0
Ditto 12in. high	0	18	0	0	4	0
Oak or laurel wreath, 9in. diam.	1	0	0	0	3	0
Ditto 12in. diam.	1	8	0	0	4	0
Ditto 18in. diam.	1	16	0	0	6	0
Per foot run.						
Egg and dart moulding, 2in. girt	0	10	0	0	0	6
Ditto do. 4in. girt	0	12	0	0	0	8
Ditto do. 6in. girt	0	14	0	0	0	10
Rope or cable do. 2in. girt	0	10	0	0	0	9
Ditto, round spiral column	0	12	0	0	1	3

Casting Ceiling Flowers from 2ft. to 5ft. diam. will cost about 2/– per sup. ft., as ascertained by squaring the diam. (2ft. diam. = 4 sup. ft. and 3ft. diam. = 9 sup. ft., &c.). All ceiling flowers should be perforated for ventilation.

PATENT FLOORINGS AND PAVINGS.

There are on the market several materials for covering concrete or brick floors, and these are of particular interest to all who are engaged in fireproof construction.

Such of these materials as have Portland cement as a matrix will adhere perfectly to concrete or brick, and the preparations known as "**Ironite,**" "**Arkilite,**" &c., have been extensively used in Australia for many years, mainly for outside work. Others, however, of **magnesite composition,** have the further advantages that they also adhere equally well to wood or iron, and whilst capable of hard, wear-resisting finish, have a resilience that renders them almost like a linoleum to the tread, which makes them very acceptable for indoor flooring. They also are made in various permanent colourings so that most artistic effects can be produced.

Further particulars can be obtained from the several makers (*see* advertisements herein), who afford special quotations according to the description and quantity of work required.

MAGNASITE FLOORINGS.

Magnasite Floorings, generally laid on site in various colours, from cream, greens, blues, reds and browns, forming a jointless composition sawdust paving or walling with different names—

"**Aegypto**" (agents' advt., p. 4), different designs, 9/– to 14/– per sq. yard, laid and finished.

"**Emco**" (agents' advt., p. 6), 9/6 to 13/6 per sq. yard.

"**Fama,**" "**Masseroid,**" "**Lignite,**" similar pavings (*see* agents' advt.).

"**Linwood**" (agents' advt., p. 38), 10/– to 14/– per sq. yard.

Cupping and Skirting to bath-room walls, per ft. run, 6d.

Terrazzo effects can be produced in Magnasite floorings within the above price.

OTHER COMPOSITION PAVINGS.

There are many makes of cement composition Pavings sold under different names, viz.—

"**Arkilite,**" "**Ironite,**" "**Steelite,**" "**Oronite,**" "**Xylite,**" all about the one price—4/6 to 5/6 per yard, laid ; also made into verandah nosings, door thresholds, &c., ready for setting.

ARKILITE, IRONITE &c.	Grey. Solid. s. d.	Red. Solid. s. d.
Arkilite Flooring (cement composition), for 50 yards or over, 1in. thick, per yard	4 6	5 6
Ditto 2in. thick, per yard	7 6	8 6
		⅝ 1in. red top.
Ditto 3in. thick, per yard	8 3	9 3
Ditto 4in. thick, per yard	9 3	10 3
Ditto 5in. thick, per yard	10 0	11 3

Risers and Skirtings, x ¾in., 4½in. to 6in. wide, 8d. per foot run. 2in. Nosings, 12in. wide, 1/6 per foot run. Closet Floors, from 10/6 Copper Tops, 7/6.

Full Return Nosings, 6d. extra ; half returns, 3d. extra.

(For details, *see* Asphaltum advt., p. 4).

CEMENT TILES.

Cement Tiles, all colours and inlaid linoleum designs, mosaic and otherwise, with borders, from 5/– to 20/–.

Commonwealth Mosaic Ornamental Tile Co. have a similar tile, 8in. x 8in. x $\frac{5}{8}$in, per yard, 6/– and 7/6.

Laying above costs—labour, 1/6 to 2/–.

(*See* Tile Layer.)

Mottled Terrazzo is composition of cement in situ with chips of granite or marble of different colours, and worked into patterns, borders, letters, or elaborate designs, and afterwards ground down to uniform surface when drying.

The price when laid is according to design, from 12/–.

Quotations, *see* manufacturer's advt., p. 4, 15, and 42.

PATENT WALL AND CEILING MATERIALS.

" Compo " Board, $\frac{3}{8}$in. thick, for Ceilings, Panels, Lining Studs Walls, &c., smooth surface, and strong.

Made in Sheets, 10 to 18ft. long x 4in. wide x $\frac{3}{8}$in. thick ; per lineal foot, 4ft. wide, 1/– ;

or per square ft. 3d. ; per square yard, 2/3.

Labour, fixing, from 3d. per sq. ft.

" Beaver " Board, a wood fibre wall board sheeting, 3/16in. thick, to take the place of lath-plaster, in lengths 4 to 10ft. long, 32in. and 48in. wide, with decorative strips, per sq. yd, 1/4.

Fibrous Plaster Slabs, Plain, Strippled, or Fancy Design Slabs, 3ft. x 3ft. x $\frac{5}{8}$in. thick, 1 sq. yd., each 1/6.

King's Fibrous Plaster Board (Diamond Brand), sheets 32in. x 36in. x 5/16, $\frac{3}{8}$in., and $\frac{1}{2}$in. thick, dark felt boards (when plastered only). Light coloured felt paper, 5/16in., cut with saw to sizes. per sq. yd., 1/3.

1$\frac{1}{4}$lb. nails will fasten 9 boards,

King's Pulp Fibre Plaster, 100lb. bag, 5/6.

Labour, fixing, per sq. yd., 3d. to 6d.

Ivory Cement Plaster, 100lb. bag, 7/–. Will cover 108 sq. yds., $\frac{1}{4}$in. thick. Mix for applying on brickwork :—3 sand and 1 cement, half to floating coat and setting coat, per sq. yd., 1/–.

Universal Finish Cement, on mack or concrete partition, $\frac{3}{8}$in. finish, including sand, per sq. yd., 6d.

U.S. Gypsum Bond, for Concrete Ceiling and Walls,

To finish, $\frac{1}{4}$in., 1/– ; $\frac{1}{4}$in., 1/3 ; $\frac{3}{8}$in., 1/6.

" Sacket " Board, Wood, Fibre and Gypsum Plaster,

36in. x 32in. x $\frac{1}{4}$in., 4 ply, per sq. yd., 1/4.

Ivory Plaster, 2 coat work on sacket board,

Material only, $\frac{1}{4}$in. thick, per yd., 8d. Add Labour.

Universal finish, 100lb. bag, 8/6.

Will cover 24 sq. yds. material, per sq. yd., 4$\frac{1}{4}$d. Add Labour.

See Agents' advt. page 51.

COMPARATIVE COST OF WALLS.

	s.	d.
1in. Oregon Boarded Partitions, per sq. yd.	4	6
Baltic Weatherboard, Studs and Lining (unpainted) ..	5	9
9in. Brickwork, at £5 per 1000, per sq. yd.	10	0
If plastered, add, per sq. yd.	1	3
If tuckpointed, add, per sq. yd.	1	6

BUILDING SLABS.

Concrete Breeze Slabs, stock sizes, 2ft. 4in. x 1ft. 6in. x 2½ins. thick, 4/6 per yard (net at works, Marrickville) ;

2ft. 4in. x 1ft. 6in. x 3in. thick, 5/– per sq. yd.

(*See* advt. pages 35 and 45).

PATENT PARTITIONS.

VARIOUS MATERIALS.

" Mack " Cement Concrete Partition Slabs. Prices, Sizes, &c.:—

	Weight per sq. yd.	Price per sq. yd. super. off works.
2in. thick, 12in. high, 7in. long ..	65lbs. ..	0 4 0
2½in. thick, 12in. high, 7ft. long ..	80lbs. ..	0 4 6
2¾in. thick, 12in. high, 7ft. long ..	85lbs. ..	0 4 9
4in. thick, 12in. high, 6ft. long (hollow)	110lbs. ..	0 5 9

N.B.—A Partition 40ft. high can be built of this Slab.

2½in. thick, 17in. high, 30in. long (smooth face), 75 to 80lb., 6/–

N.B.—No finishing Coat required for this Slab. Papered a few hours after erection.

Ceilings—

¾in. thick, 4ft. 6in. long, 2ft. wide 30lbs. .. 0 1 10

" Mack " Quick-set Plaster must be used in fixing all Slabs, 5/– per cwt.

" Mack Floating," a quick setting Cement, can be " knocked-up " or mixed and used at once, without " pricking-up " previously.

For laths up to ½in. apart the gauge is 2 parts sand to 1 of plaster, cowhair to be added for ceilings.

It can be painted, colored, papered, or set in a few hours.

One cwt. will cover 8 to 10 sq. yds. (¾in. thick) of laths, 2 to 1 gauge ; 18 to 20 sq. yds, of Brickwork at a gauge of 4 to 1.

It may be used as mortar for quick building. Plasterers or bricklayers can retard it as required by using a little weak size.

Price, in Bags, £4 per ton. City delivery.

PATENT REVOLVING SHUTTERS.

Per foot super.	s.	d.
Patent automatic steel interlocking Shutters, fireproof, for lift openings and brdge ways, &c. .. .. 5/– to	6	0
Self-coiling revolving wood shutters for shop fronts and private houses, fixed, balanced by weights	3	0
Interlocking self-coiling steel shutters, fire-resisting, burglar proof, from	4	0
Self-coiling wood revolving shutters, balanced by weights or springs, early English registered design, with chequered pattern in red deal, height of openings from 8ft. to 15ft.	3	0

(*See* page 169 ; also advt. pages 17 and 20).

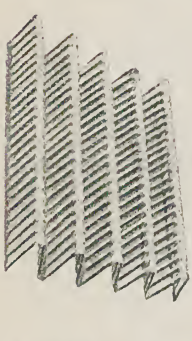
"**Amiwud**" is Compressed Wood Pulp Board, for interior panelling Walls, Dados and Ceilings, in **Golden Oak, Weathered Oak, Jenisero, Mahogany,** and **Plain.** It is nailed directly to the studding or joists, and Amiwud Battens are fixed over the joints.
It may also be fixed to plugging on brick or plaster walls.

"Amiwud" Sheets. 3/16in. thick.	per Sheet. Grained.	Natural grey Plain.
10ft. 6in. x 2ft. 8in.	0 9 0	color.
9ft. 6in. x 2ft.	0 6 0 ..	0 3 9
8ft. x 4ft.	..	0 6 8
7ft. 6in. x 2ft.	0 4 9 ..	0 3 0

Labour fixing from 3/– to 5/– per 10ft. square.
"Amiwud" can be kalsomined if required. (*See* advt. page 6).

THREE-PLY VENEER

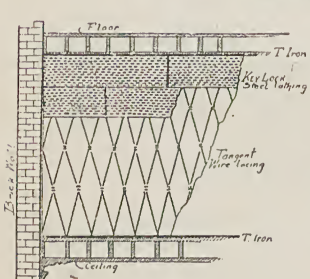
3-ply Veneer, Plain and Special Woods, from 1/– to 3/6 per sq. yd.



Trusset Metal, in sheets 7ft. 6in. long x 1ft. 9in. wide, for partitions and unsupported short span ceilings, per super yard 2 6
Labour, fixing sheet, per 6d. to 0 9
See advt. pages 38.

Trusset metal for partitions, is sometimes fixed with connecting iron rods, wired into corrugation, the ends fastened to cleats top and bottom, or holes bored in boards for the rod end.

A previous coating of wash-cement is a protection on all steel lathings before lime plasters are applied.



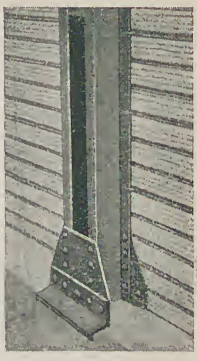
Macintoshes Tangent Process, with **Key-lock lathing** combined, a diagonal wire 2ft. x 6in. mesh fixed from floor to ceiling.

	per yd.
Lathing and wires fixed, com.	3 6
Cement, sand, ashes & plaster	2 0
Labour, plastering	2 3
Double-faced 2in. partition, net cost, per sq. yd. ..	7 9

Proportion required :—12 buckets screened ashes, 2 buckets cement mixed with 6 buckets lime water, containing two buckets cow hair.

Finish both sides with 4 to 1 sand and cement. First coat with four parts washed furnace cinders, one part cement, 1 bushel hair to the cubic yard. Finishing coat with lime putty. Add studding if used. (*See* Carpenter and Plasterer for other finish).

Hyrib Reinforcement, in Partitions, used horizontally, without intermediate studs. For price *see* Concrete Section.



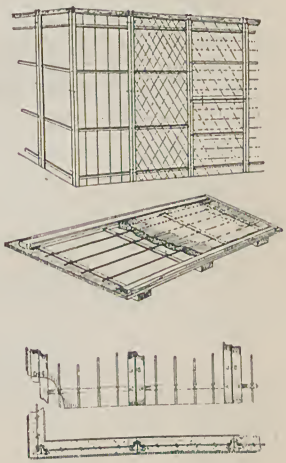
Hyrib is made with deep strengthening ribs pressed into a flat perforated sheet of open hearth steel, and forms a rigid sheet lengthwise.

In suspended floors and ceilings these sheets are placed with rib uppermost for strength, leaving the even surface under for plastering.

For partitions or walls about 2ins. thick the ends are secured by strong gal. iron staples or nails to wood or stout wire, and plate clips to iron supports. The ribs are generally placed horizontally with ribs interlocking, as shown on figure, with a cement body plaster of 1 cement to 4 sand or cinders, and formal finishing coat of white Keene's cement.

Pat. Reinforced Cement Walling, 2in. thick, bolted together in sections, per sq. yard, finished, 7/6 to 10/6.

For further information, *see* advt., p. 3.



The frames consist of light steel angles, with cross-bars, to which are wired any of the many forms of metal reinforcements, whether of woven wire mesh, expanded metal, patent lathing, Clinton Fabric, or steel rods.

Method.—These frames are laid upon a table or pallet, filled in with concrete and tamped solid, and left to harden.

The sections are erected in a cradle before being thoroughly dry, bolted together through the steel angles at the edges, the hand-holes to these bolts then being filled and stopped with concrete.

The panels or units (usually 3ft. 6in. wide by 10ft. or 11ft. high) being completely erected, the concrete walls or partitions are then rendered with a coat of cement together with a waterproofing composition to give a finished appearance to the structure. This may be smooth or with a rough cast coating.

PLUMBERS' WORK.

GALVANISED IRON.

Measurements.

Lead work is usually charged by the lb. or cwt.

Close copper nailing and overlaps, soldering to joints, by the ft. run.

Water and Gas pipes by the ft. run.

Gas and Water fittings by the number of points of exit.

Galvanised Corrugated Iron Roofing and Ceilings by the square or 100 super. ft.

In measuring eaves gutters, for every angle reckon 3ft. extra of gutter, or else add the price of the angles separately.

Valley and Ridge capping should be at least 24 gauge, although 22 gauge would be better still.

Gal. Iron will last at least seven years without painting. If painted, non-poisonous paints should be used if the rain water is utilised for drinking purposes.

GALVANISED CORRUGATED IRON.

In sheets, 4½ft., 5ft., 6ft., 7ft., 8ft., 9ft., and 10ft. long by 2ft. 3in. wide, with 3in. corrugations, or 2ft. wide with a lap of one corrugation, which is sufficient for fences ; but a lap of two corrugations is required for ordinary roofs, with an end lap of at least 6in.

COVERING CAPACITY OF GAL. IRON.

Weight per square.	Gauge. 24	26
Lapped 2 corrugations	180	130
Lapped 1 corrugation	150	110
One ton of iron will cover—		
7ft. sheets cover, 2 sheets span, 6in. centre lap and 2 corrugations, making covering 13ft. 6in. x 1ft. 9in.	24 g. 14.20	26 g. 18.86
2 cases of 10ft. sheets, 1 sheet span, will cover ..	15.60	19.60
Squares per ton, lapped 1 corrugation	15.00	20.36
Ditto do. lapped 2 corrugations	12.44	17.23

This calculation is made from the average number of 5ft and 6ft. sheets per ton, reckoning five of each for single lap, and six of each for double lap, and 12in. for end laps per square.

GAL. CORRUGATED IRON SKYLIGHTS.

6ft. to 10ft. sheet, 16/– to 21/– ; opening skylight, 20/– to 25/–, unglazed.

THE "HURRICANE" SKYLIGHT.

Glass Measurement.	Hinged.	Unhinged.	Glass Measurement.	Hinged.	Unhinged
2ft. x 1ft. 6in. ..	21/–	18/–	4ft. x 2ft. ..	34/–	27/–
2ft. x 2ft. ..	21/–	18/–	3ft. x 3ft. ..	36/–	28/–
3ft. x 2ft. ..	28/–	24/–	4ft. x 3ft. ..	45/–	33/–

Add labor for fixing skylights, 5/–.

If wages or material alter in price, add or deduct.

GALVANISED CORRUGATED IRON.

At £20 ton.

Per Sheet.

	5ft.	6ft.	7ft.	8ft.	9ft.	10ft.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
24 gauge	2 5	2 11	3 5	3 10	4 4	4 10
26 gauge	1 8	2 0	2 5	2 9	3 1	3 5

Sheets in Case (half ton).

24 gauge	83	70	60	51	45	41
26 gauge	116	97	83	73	64	57
Sheets in case, 28g.	133	113	95	83	75	70
Per sheet ..	1 9	2 1	2 6	2 10	3 3	3 7

CEILING IRON (1in. Corrugations).

Lengths	5ft.	6ft.	7ft.	8ft.	9ft.	10ft.
Sheets in case, 26 g.	122	99	86	75	67	60
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Per sheet ..	1 10	2 3	2 7	3 0	3 6	4 1

5ft. to 8ft., £22 ; 9ft., £23 ; 10ft., £24 per ton.

GALVANISED CORRUGATED IRON.

Labour only, per square. s. d.

Present wages of Plumber, per hour, 1/6.

Hip roofs, covered with corrugated gal. iron, 24 to 26 gauge, double laps 6 0

Gable roofs, do. do. 4 6

Ditto, no cutting, and 4 sheets run flat roofs 3 6

Balcony, verandah, curved roofs .. .. -8 0 to 10 0

Small corrugated sheets, ceilings 5 6

Fences, 6ft. sheets, screwed, bottom, top, middle, and sides of sheets 3 6

Ordinary mixed roof tips valleys gables, average 5 6

Curving Galvanised Corrugated Iron, per sheet— s. d.

For verandahs, bull-nosed O.G. or dished .. 3d. to 0 6

For tanks, &c., half circle, 6d. ; circle 0 9

Present Contract Prices, per square, fixed— £ s. d.

Corrugated iron roofs, 24 gauge 1 16 0

Corrugated iron roofs, 26 gauge 1 10 0

Corrugated ceilings, small section 1 10 0

Gal. iron hips and ridges and valleys, per ft. run .. 0 0 9

PLAIN GAL. SHEET IRON.

At £19/10/- per ton.

Length	6ft. x 24in.	6ft. x 30in.	6ft. x 36in.
Sheets in case, 24g.	89	70	59
Per sheet, each	2/3	2/10	3/4
Sheets in case, 26g.	120	98	80
Per sheet, each	1/8	2/-	2/5
Sheets in case, 28g.	140	112	88
Per sheet, each	1/5	1/9	2/1

Prices are subject to Market Fluctuations.

DOWN PIPES.

MALLEABLE CAST IRON RAIN WATER PIPES.

Pipes with or without Ears in 6ft. lengths.

Diam. of pipe	2in.	2½in.	3in.	4in.
	s. d.	s. d.	s. d.	s. d.
Per ft. run in 6ft. lengths (shorter lengths extra prices)	0 5	0 6	0 6½	0 8½
Single junctions, each	1 2	2 3	2 6	3 6
Double junctions, each	2 6	3 0	3 6	5 0
Bends and elbows, each	1 2	1 4	1 6	2 0
Heads	2 0	2 3	2 6	3 0
Shoes	1 0	1 2	1 6	2 0
Sockets	0 8	0 11	1 1	1 6

Swan necks, all angles and lengths, extra price.

Labour, fixing, from 3d. (putty joints) to 6d. per ft. lead joints. Junctions, shoes, elbows, swan necks, 6d. to 1/– each.

If by weight, reckon for 3 or 4in. pipes about 16/– per cwt.

Gal. Iron Down Pipes, per 6ft. length.

Diam. of pipe	2in.	2½in.	3in.	3½in.	4in.	5in.	6in.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
28 gauge	0 8	0 10½	0 11	1 2	1 3	1 10	2
26 gauge	0 10	1 0	1 2	1 4	1 8	2 0	2 6
24 gauge	1 0	1 3	1 6	1 9	1 10	2 6	3 0

Square Down Pipes, per 6ft. length.

	2 x 3	2 x 4	3 x 3	3 x 4	3½ x 3½	4 x 4
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
28 gauge	1 3	1 4	1 5	1 6	1 7	1 8
26 gauge	1 4	1 6	1 7	1 8	1 9	1 10
24 gauge	1 8	1 11	2 0	2 1	2 3	2 4

O.G. and Quadrant Guttering, per 6ft. length.

	Stock.	26 gauge.	26 gauge.
	s. d.	s. d.	s. d.
4in.	0 7	0 10	1 2
4½in.	0 7	0 11	1 3
5in.	0 7½	1 0	1 4
6in.	0 8½	1 2	1 6

O.G. Angles.

	Stock.	26 gauge.	24 gauge.
	s. d.	s. d.	s. d.
4in.	1 0	1 3	1 5
4½in.	1 0	1 4	1 6
5in.	1 2	1 5	1 7
6in.	1 3	1 6	1 8

O.G. Gal. Iron Down Pipe Heads.

2in.	2½in.	3in.	3½in.	4in.
2/6 to 3/6	2/8 to 4/–	2/9 to 4/6	3/3 to 5/6	3/6 to 6/–

Gal. Iron Ridging.

	12in.	14in.	15in.	16in.	18in.
	s. d.	s. d.	s. d.	s. d.	s. d.
Stock	0 11	1 0	1 1	1 2	1 4
26 gauge	1 3	1 4	1 6	1 7	1 9
24 gauge	1 6	1 8	1 9	1 10	2 0

s. d.

Galvanised Steel Ventilating Ridge, 6ft. length, 13/6.
Gal. Iron Battlement, high or low ridging, per ft. run 2 0
Gal. Iron Scroll End Finial, 11in. x 8in., to fit ridging, each .. 5 0
Spikes and Tubes, per doz., 10d. ; Nozzles Stop Ends in gutter, 6d. each ; Slip Joints, 3½d. ; Brackets, H.R., Q.R., and O.G. Short, per doz., 1/6 ; long, per doz., 2/3.

Labour—Downpipes, Gutterings (according to size and gauge)—

	s. d.		s. d.
Fixing down pipe, including solder, per foot ..	0 1½	to	0 4
Fixing spouting or eaves, guttering, per foot ..	0 2	to	0 4
Fixing plain sheet gal. iron on partitions, advt. hoardings, nailed around edges with clouts 4ft. apart, per square			8 6
Fixing ridges, including screws and washers, per 6ft length	1 0	to	1 3

24 G. Galvanised Iron Tanks, fitted with Tap and Overflow—

200 gal., weight 90lbs., 34/– ; 400 gal., weight 142lbs., 40/– ; 600 gal., weight 185lbs., 60/– ; 800gal., weight 214lbs., 70/– ; 1000 gal., weight 256lbs., 85/–.

COWLS.

Ventilating **Cowls (" Princeps ")**—

	Inches Diameter.								
For a shaft ..	2	3	4	6	9	12	15	18	24
Each		6/–	8/6	15/–	24/6	35/–	55/–	85/–	125/–

VENT COWLS—

	Inches Diameter.			
Pipes	2	3	4	6
each	1/–	2/3	2/6	4/6

SANITARY VENT PIPES—

24 gauge, painted inside, per 6ft. length	1/–	1/6	2/2	3/–

Iron Stays for same, per set, 3/6.
Lobster Back Cowls— 1/5 1/10 2/5
Galvanised Iron Mita Flaps, each 4/–
Galvanised Induct Cowls, each 1/4
Chimney Cowls, with 6ft. pipe, each 7/–.
Malthouse Cowls, with 4ft. pipe, each 11/–.
Galvanised Steel Louvred Vents, 9in. x 6in., per doz., 10/6.
Stamped Zinc Ornamental Vents, 9in. x 6in, per doz., 13/–.
Terra Cotta Hooded Vents, 10/6.

BIRMINGHAM IRON TUBE TRADE LIST.
WROUGHT IRON TUBES AND FITTINGS,
FOR GAS, WATER, AND STEAM.

Internal Diam. inches	⅛, ¼	⅜	½	¾	1	1¼	1½	1¾	2	2¼
TUBES.										
Tubes, 2ft. up, foot	3d	3½d	4½d	6d	8½d	1/–	1/3	1/6	1/9	2/6
Pieces, 12-23½in. each	8d	9d	11d	1/3	1/9	2/6	3/3	3/11	4/7	6/9
Pieces, 4 to 11½ ,,	5d	5½d	7d	10d	1/1	1/6	2/–	2/5	2/10	4/3
Longscrews—										
12 to 23½in. ,,	9d	10d	1/–	1/4	1/10	2/8	3/6	4/3	5/–	7/6
4 to 11½ in ,,	6d	6½d	8d	10d	1/2	1/8	2/3	2/9	3/3	5/–
Bends .. .. ,,	7d	8d	10d	1/–	1/6	2/6	3/–	4/–	5/–	8/6
Springs, not socketed	5d	6d	7d	9d	1/1½	1/11	2/3½	3/1	3/11	6/9
FITTINGS—										
Socket Union, Pipe										
Union each	2/–	2/6	3/–	4/–	5/6	6/9	8/–	9/–	10/–	15/–
Elbows, Square ,,	8½d	9d	10d	1/–	1/4	1/10	2/5	3/–	3/10	6/3
Tees .. .. ,,	9d	10d	11d	1/2	1/5	2/–	2/6	3/2	4/3	6/6
Crosses .. .. ,,	1/4	1/6	1/11	2/4	3/–	4/–	4/10	6/–	7/9	14/–
Plain Sockets ,,	2d	2d	3d	3½d	4½d	6½d	8½d	11d	1/1	1/9
Dimin. Sockets ,,	3d	4d	5d	6d	7d	9d	11d	1/2	1/4	2/3
Flanges .. ,,	9d	10d	1/–	1/2	1/4	1/9	2/–	2/3	2/9	4/–
Caps .. .. ,,	3½d	3½d	5d	6d	8d	1/–	1/3	1/7	2/–	3/–
Plugs .. .. ,,	3d	3d	4d	5d	6d	8d	10d	1/–	1/3	2/–
Backnuts .. .. ,,	2d	2d	3d	3½d	5d	6d	8d	10d	1/1	1/9
Nipples .. .. ,,	2d	2d	3d	3½d	4d	6d	8d	10d	1/–	1/9
Barrel Nipples ,,	5d	5d	7½d	9d	10d	1/3	1/8	2/1	2/6	4/4
Union Bends ,,	2/6	3/–	3/9	5/–	6/3	8/6	10/–	11/6	13/6	21/–
Elbows, Round ,,	9½d	11d	1/–	1/3	1/6	2/1	2/7	3/6	4/6	6/9
Iron Main Cocks ,,	2/3	2/9	3/6	4/6	6/6	8/6	11/–	14/–	18/–	27/–
Iron Main Cocks, with brass pgs. ,,	..	7/–	8/9	11/6	16/–	21/6	28/–	35/–	45/–	68/

Tubes cut to exact lengths, if screwed and socketed, are charged 2½ per cent. less gross discount than random lengths.

Tubes in random lengths, not screwed, are charged at the current discount, with an extra allowance of 2½ per cent. off the net.

Tubes cut to exact lengths, and not screwed, are charged as screwed and socketed in random lengths.

Tubes screwed and sent without sockets, are charged at the current discount with an extra 1¼ per cent. off the net.

All lengths 4in. to 2ft. are considered pieces.

Intermediate diameters are charged at the next higher price.

WROUGHT IRON TUBES AND FITTINGS FOR GAS, WATER, AND STEAM.—*Continued.*

Internal Diam. inches	$2\frac{1}{2}$	$2\frac{3}{4}$	3	$3\frac{1}{2}$	4	$4\frac{1}{2}$	5	$5\frac{1}{2}$	6
TUBES.									
Tubes, 2ft. up, per foot	3/–	3/3	3/6	4/6	5/6	6/–	6/9	7/9	8/9
Pieces, 12 to $23\frac{1}{2}$in. each	8/6	9/6	10/6	13/2	16/–	21/–	24/6	29/6	35/–
Pieces, 4 to $11\frac{1}{2}$in. ,,	5/6	6/3	7/–	9/1	11/–	15/6	18/3	22/3	26/6
Longscrews—									
12 to $23\frac{1}{2}$in. ,,	9/7	11/3	12/–	15/3	17/–	23/3	27/–	32/6	38/6
4 to $11\frac{1}{2}$in. ,,	6/4	7/6	8/3	10/9	12/3	17/–	20/3	24/6	29/3
Bends ,,	12/–	15/–	18/–	25/–	32/6	80/–	105/	135/	150/
Springs, not socketed ,,	9/6	12/–	14/6	20/–	26/6	70/–	93/–	120/	132/
FITTINGS.									
Socket Union, Pipe Union each	17/6	20/–	22/6	27/6	35/–	48/–	66/–	84/–	105/
Elbows, Square ,,	9/–	11/6	14/–	22/–	28/–	75/–	95/–	120/	150/
Tees ,,	9/6	12/6	16/6	24/–	30/–	78/–	98/–	125/	155/
Crosses ,,	21/4	28/–	40/–	56/–	66/8	175/	220/	280/	350/
Plain Sockets ,,	2/6	3/–	3/6	5/–	6/–	10/–	12/–	15/–	18/–
Diminished Sockets ,,	3/3	4/–	5/–	7/–	9/–	25/–	35/–	45/–	55/–
Flanges ,,	5/–	6/9	8/6	10/–	11/6	16/–	18/–	23/–	27/–
Caps .. .. ,,	4/4	5/3	6/–	9/9	10/6	25/–	30/–	37/6	45/–
Plugs .. .. ,,	2/6	3/6	4/9	7/–	10/–	22/–	30/–	39/–	48/–
Backnuts .. .. ,,	2/3	3/–	3/6	4/6	5/6	14/–	18/–	21/–	26/–
Nipples .. .. ,,	2/3	3/–	3/6	4/6	5/6	14/–	18/–	21/–	26/–
Barrel Nipples ,,	5/8	7/6	8/9	11/3	13/9	28/–	36/–	42/–	52/–
Union Bends ,,	27/–	32/–	37/–	49/–	58/–	78/–	100/	135/	160/
Elbows, Round ,,	10/–	13/–	17/–	25/–	32/–	75/–	95/–	120/	150/
Iron Main Cocks ,,	40/–	50/–	60/–	85/–	110/	210/	270/	360/	420/
Iron Main Cocks, with brass plugs .. ,,	100/	112/	125/	212/	250/	360/	450/	570/	660/
Round Way I. Cocks ,,	60/–	65/–	75/–	120/	160/	..	..	..	..
Cock Spanners, Wt. I. ,,	6/–	7/6	9/–	12/–	14/–	16/–	19/–	22/–	24/–
Ditto. Mal. cast Iron ,,	6/–	7/6	9/–	12/–	14/–	16/–	19/–	22/–	24/–

The above quotations are subject to a varying discount.

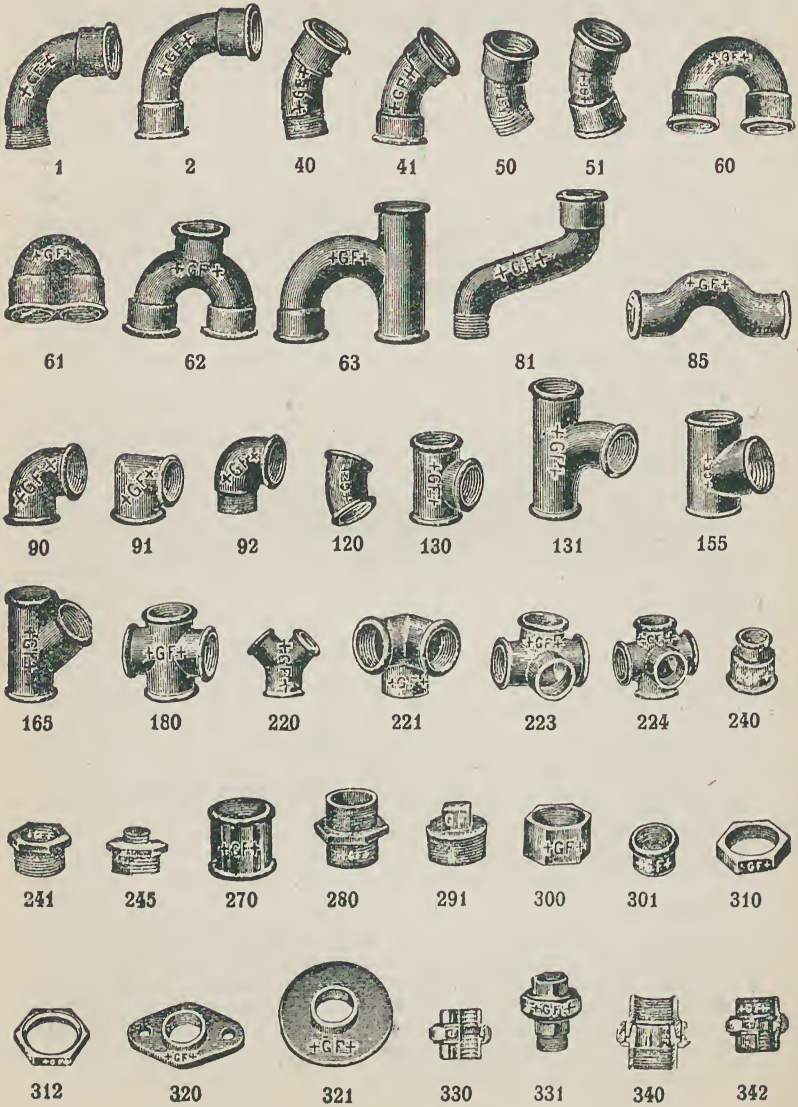
Present trade discount off list—$67\frac{1}{2}$ per cent. on black iron (gas); 60 per cent. gal. iron (water); $57\frac{1}{2}$ per cent., gal. iron (steam).

Tubes coated inside and outside with Dr. Angus Smith's or any other solution are charged at $2\frac{1}{2}$ per cent. less gross discount.

Orders for screwed and socketed tubes are always executed in gas quality, if no other quality is specified.

(*See* advt., pages 13, 31, 34, &c.

MALLEABLE CAST IRON PIPE FITTINGS.



(See advt., page 7).

MALLEABLE CAST IRON PIPE FITTINGS.

		inches	⅜	½	¾	1	1¼	1½	2	2½	3	4
Bends	No. 1	..	–/8	–/10	1/1	1/8	2/10	4/–	5/10	11/8	17/6	31/8
Springs	,, 40 and 50	..	–/6½	–/8	–/11	1/4	2/3	3/3	5/–	9/4	14/–	26/8
,,	,, 41 and 51	..	–/6½	–/8	1/1	1/8	2/8	3/9	5/10	10/10	14/8	28/4
Return Bends	No. 60	..	–/11	1/4	2/–	2/10	4/–	5/4	8/9	14/2	20/–	41/8
,,	,, ,, 61	..	–/9	1/1	1/9	2/6	3/8	5/–	7/6	11/8	..	..
,,	,, ,, 63	..	..	1/9	2/8	3/9	5/4	7/6	11/8	..	..	..
Offsets	,, 81	..	1/–	1/5½	2/1¼	3/1½	4/8	5/6	8/8	13/9	..	..
Crossovers	,, 85	..	..	1/8	2/6	3/4	5/–	6/3	10/–	..	..	..
Elbows, Round	,, 90	..	–/6	–/8	–/11	1/4	1/10	2/3	3/6	6/6	11/8	20/–
Elbows, Square	,, 91	..	–/6	–/8	–/11	1/4	1/10	2/3	3/6	6/6	11/8	..
Street Elbows	,, 92	..	–/7	–/9	1/1	1/6	2/1	2/7	4/2	7/6	13/4	22/11
Elbows 45°	,, 120	..	–/6	–/8	–/11	1/4	1/10	2/3	3/6	6/6	11/8	20/–
Tees	,, 130	..	–/7	–/9	1/1	1/6	2/1	2/7	4/2	7/6	13/4	22/11
,,	,, 131	..	–/11	1/2	2/–	3/–	4/2	5/–	8/4	15/–	26/8	45/10
,, Angle 75°	,, 155	..	–/9	1/–	1/5	1/10	2/9	3/4	5/6	10/–	17/6	..
,, ,, 45°	,, 165	..	–/9	1/–	1/5	1/10	2/9	3/4	5/6	10/–	17/6	29/2
Crosses	,, 180	..	–/9	–/11	1/4	1/10	2/6	3/1	5/–	9/2	16/–	27/6
Y Pieces	,, 220	..	–/11	1/2	1/10	2/5	3/8	4/6	6/8	12/6	16/8	..
Angles	,, 221	..	–/11	1/2	1/8	2/3	3/2	4/–	6/3	11/3	20/–	..
Double Tees	,, 223	..	1/2	1/6	2/2	3/–	4/2	5/2	8/4	15/–	21/8	45/10
, Crosses	,, 224	..	1/6	1/10	2/8	3/8	5/–	6/2	8/9	18/4	31/8	53/4
Reducing Sockets	,, 240	..	–/4	/–5½	–/7½	–/10	1/2	1/6	2/3	4/–	6/5	10/10
Bushes	,, 241	..	/3	–/4	–/6	–/8	–/11	1/2	2/2	3/9	5/10	10/–
Sockets	,, 270	..	–/3½	–/4¾	–/6½	–/8½	–/11½	1/3½	1/11	3/8	5/10	10/–
Hex Nipples	,, 280	..	–/3¾	–/5½	–/7¼	–/9½	1/4	1/8	2/6	4/–	5/10	13/4
Plain Nipples	,, 531	..	–/2	–/2½	–/3½	–/5	–/7¼	–/9½	1/2½	2/3	2/11	6/8
Plugs	,, 291	..	–/2	–/2½	–/4	–/5½	–/7½	–/10	1/2	2/6	3/6	6/8
Caps	,, 300	..	–/3	–/4	–/6	–/8	–/11	1/3	1/11	3/4	6/8	10/–
,,	,, 301	..	–/3	–/4	–/6	–/8	–/11	1/3	1/11	3/4	6/8	10/–
Locknuts	,, 310	..	–/2¼	–/2½	–/3½	–/4	–/5½	–/7½	–/11½	1/8	2/10	5/–
Flanges	,, 320	..	–/8	–/11	1/5	1/10	2/6	2/11	3/5	4/9	6/8	10/–
Unions	,, 330	..	1/8	2/–	2/6	3/–	4/–	5/4	7/6	13/4	21/8	41/8
,,	,, 340	..	2/5	2/10	3/6	4/5	6/3	7/8	10/6	18/9	30/10	58/6

WATER AND GAS PIPES.

Material and Labour, including Tees, Elbows, complete.

Pipes.	Approximate. Labour, per ft. s. d.	Fixed, per foot run. Water. s. d.	Gas. s. d.
⅛in. inside diam. ..	0 2½	0 4	0 3½
¾in. ,, ..	0 3	0 7	0 6
1 in. ,, ..	0 4	0 10	0 9
1¼in. ,, ..	0 6	1 3	1 0
1½in. ,, ..	0 9	1 6	1 3
1¾in. , ..	1 0	1 9	1 6
2 in. ,, ..	1 3	2 0	1 9
2½in. ,, ..	1 6	3 4	2 10

The number of bends, junctions, cuts, or short lengths increase the cost.

Cost of Laying Surface Pipes (Water)—

Labour and Materials connecting water to main service (exclusive of W. & S. Board main fittings), including opening ground, boring main, cutting through and making good to walls, floors, &c.

Laying on Gas in the Cities.

Connecting with meter, including all necessary T. and angle pieces, cocks, iron and tin pipes, or tubes fixed to receive gasaliers, at per point or connection .. .. s. d. 15 0

N.B.—Fittings, gasaliers, &c., generally supplied or chosen by the proprietor. The Sydney and North Sydney Gas Company supply and lay service pipe from the main to meter.

In laying gas-pipes through floors, the **centre of the joists** should not be cut away, because the joists are weakened in proportion to the depth cut away, whereas the ends of the joists (to one-eighth of the span) may be cut away to one-third of their depth, or at one-quarter of the span to one-sixth of their depth, without in any way weakening them.

EXCAVATION ONLY.

Labour.

For Plumber's Pipes and Filling in same, per yard run.

	s. d.	s. d.
12in. to 2ft. deep	0 3 to	0 6
3ft. deep x 12in. wide		0 9
Ditto, extra, through blue metal road, 12in.		0 0
Ditto, extra, through soft sandstone rock, 2ft. deep		0 0

BRASS STOP COCKS (W. and S. BOARD).

Price, Fixed, Complete.

	s. d.		s. d.
¾in., each	4 9	1¼in., each	15 0
1in. ,, ...	8 0	¾in. Brass Cock Forges ..	3 4
		1in. Brass Cock Forges ..	8 0

BRASS TUBING.

Including all Fittings, per ft. run, fixed.

	s. d.
⅝in. diameter	0 8
½in. diameter	0 7
⅜in. diameter	0 6

COMPOSITION PIPE.

For Gas Connections, Pneumatic Tubes for Organs and other purposes.

Price, per lb., 4d.

Inside Diameter. in.	Outside Diameter. in.	Weight per Yard. lb.	oz.	Inside Diameter. in.	Outside Diameter. in.	Weight per Yard. lb.	oz.
1/4	3/8	1	0	5/8	3/4	1	12
5/16	7/16	1	2	3/4	7/8	2	5
3/8	1/2	1	4	7/8	1 1/32	3	10
1/2	5/8	1	9	1	1 3/16	5	7

PURE TIN PIPES.—Light Gauges.

Price, per lb., 2/6.

Inside. Diam. in.	Outside Diam. in.	Approximate Weight per yd. lb.	oz.	Inside Diam. in.	Outside Diam. in.	Approximate Weight per yd. lb.	oz.
1/8	3/16	0	2 1/4	3/4	7/8 bare	1	2 1/2
3/16	1/4	0	3	7/8	1	1	12 1/2
1/4	5/16	0	4	1	1 1/8 bare	1	8
3/8	7/16	0	6	1 1/4	1 7/16	3	8
1/2	9/16	0	11 1/2	1 1/2	1 5/8	3	4
5/8	3/4 bare	1	1	1 3/4	129/32	4	3
				2	2 3/16	4	11

LEAD SOIL PIPE.—7lb. Gauge.

In lengths of 10ft. and 12ft.

Inside Diameter.	Weight per yard. lbs.	Per ft. run. lbs.	Per cwt. Approximate ft.	in.
1 1/2	8	2 2/3	42	0
2	10	3 1/3	33	7
2 1/2	13	4 1/3	25	8
3	15	5	22	5
3 1/2	18	6	18	8
4	21	7	16	0
4 1/2	24	8	14	0
5	27	9	12	5

In 10ft. lengths, per cwt., 31/6.

Labour, laying, per cwt., 12/–.

LEAD WASTE PIPES.—6lb. Gauge.

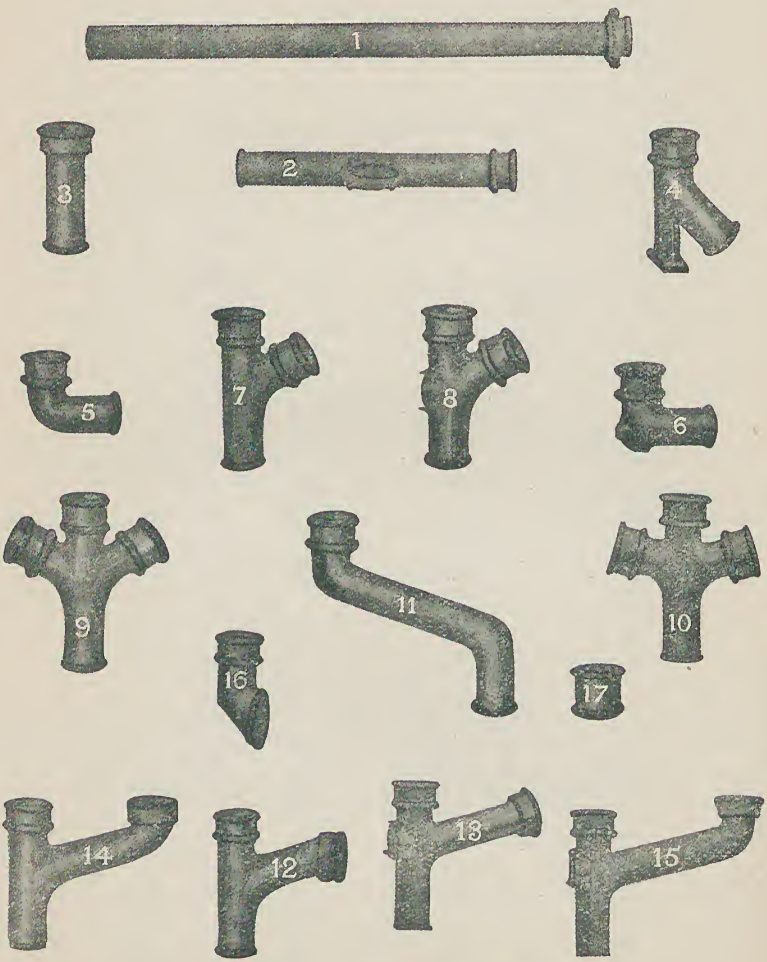
In lengths of 10ft. and 12ft.

Inside Diameter.	Weight per yard. lbs.	Per ft. run. lbs.	Per cwt. Approximate. ft.	in.
1 1/2	7	—	48	0
2	9	3	37	4
2 1/2	12	4	28	0
3	14	4 2/3	24	0
3 1/2	16	5 1/3	21	0
4	18	6	18	8
4 1/2	20	6 2/3	16	10
5	23	7 2/3	14	2

In 10ft. lengths, per cwt., 31/6. **Labour**, laying, per cwt., 12/–.

SANITARY SOIL PIPE FITTINGS.

Malleable Cast Iron.



(See Manufacturers' advt., page 29).

SANITARY SOIL PIPE FITTINGS.

Malleable Cast Iron.

(*Pipes Covered with Dr. Angus Smith's Solution.*)

Fig. 1—**Soil Pipes,** in 6ft. lengths—

	2in.	2½in.	3in.	4in.
Per foot run ..	10d.	1/–	1/1	1/3

Shorter lengths extra price.

Fig. 2—**Pipes with Inspection Door**—

	2in.	3in.	4in.	6in.
Each	10/3	10/6	11/–	12/4

Fig. 3—**Short Connecting Pipes, for joining Earthenware to Iron Pipe**—

	9in.	12in.	15in.	18in.
Long				
Each	2/6	2/9	3/3	4/–

	2in.	2½in.	3in.	4in.
Fig. 4—Bends or Elbows with Heel Rest ..	2/9	3/–	3/6	4/4
„ 5—Bends or Elbows	2/2	2/4	2/11	3/8
„ 6—Bends or Elbows with Inspection Door	5/3	5/7	6/1	7/5
„ 7—Single Branches or Junctions ..	3/2	3/8	4/3	5/9
„ 8—Ditto, with Inspection Door ..	6/4	6/10	7/5	10/–
„ 9—Double Branches or Junctions ..	3/11	4/6	5/–	7/4
„ 10—Ditto, with Inspection Door ..	7–1	7–8	8/2	11–7
„ 11—Swan Necks or Offsets, 3in. projection	2/2	2/11	3/8	4/6
„ „ 6 „	2/8	3/5	4/3	5/–
„ „ 12 „	3/5	4/3	5/–	6/4
„ „ 15 „	4/–	4/9	5/6	7/5
„ „ 18 „	4/6	5/3	6/1	7/11
„ „ 24 „	5/6	6/4	7/1	8/11

Sanitary Branch with Socket for Earthenware Closet Pans—

	Fig. 12 for P trap	Fig. 14 for S trap	Fig. 15 with Inspection Box.
9in. projection ..	5/4	6/10	11/–
12in. „	7/–	7/9	11/10
15in. „	17/–	9/–	13/9
18in. „	10/–	10/6	14/9
21in. „	10/6	11/6	15/6
24in. „	12/1	12/9	16/10

Labour, fixing and jointing in long lengths, 1/6 to 2/6 each; or 3d. to 5d. per ft. run.

Fig. 16—**Pipe Clips or Holder,** bat., each, 2/–.

Fig. 17—**Shoes, with or without ears,** 1/6 to 2/6; double sockets, 3d. less.

SHEET LEAD.

Sheets, 30 to 40ft. long, by 7ft. wide.

Per sq. ft.		in.	Approximate Gauge.	Per Roll. cwt.	qr.	lb.
3lbs.	—	1/20	No. 18	6	2	0
4lbs.	—	1/15	No. 16	8	2	0
5lbs.	—	1/12	No. 14	10	3	0
6lbs.	—	1/10	No. 12	13	0	0
7lbs.	—	1/9	No. 11	15	0	0
8lbs.	—	1/8	No. 11	17	0	0

Price, £26 per ton ; £27 cut to lengths.

LABOUR ONLY.

Award wages, 1/4½ per hour.

Laying sheet lead, flats and floors, 10ft. lengths (including solder, hooks, nails, &c.)	4	0
Small flats, cut sheets	5	0
Laying Gutters	6	0
Ridges, valleys and hips	6	0
Step flashings	7	6
Damp course to chimneys walls, and windows, 3lb. and 4lb.	5	6
Lining small cisterns, 5lb. lead	8	0
Lining large cistern troughs	6	0
Laying hips, ridges and flashings to dormers or turrets, 10/– to	12	0
Add for every 10ft. above 30ft. high, extra	0	6
Soldering seams, per foot run	1	6
Making single welt, per foot run	0	6
Double welt, per foot run	0	7
Bedding in white lead, 3d. ; close copper nailing, foot run	0	3

Labour to Lead Pipes—

Laying and fixing lead pipes, to ¾in. diam., per ft. run	0	3
Ditto do. do. 1 to 1½in. ,, ,, ,,	0	6
Ditto do. do. 1½ to 2in. ,, ,, ,,	0	9

Fixing 7 lb. Lead Soil or Waste Pipes, 3in., per foot, 1/3 ; 4in., 2/– ; or 10/– to 12/– per cwt.

Joints at trade rates.

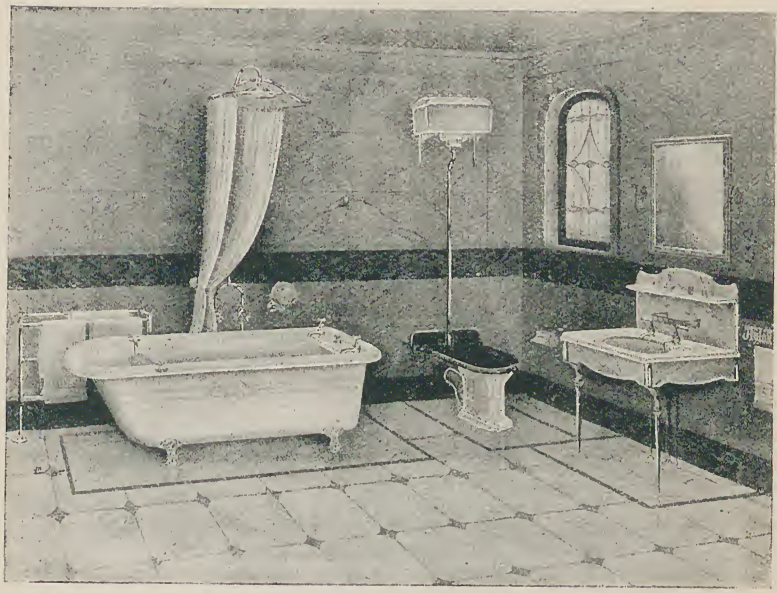
LEAD TRAPS.

Lead Traps, with screw, for outlet—

	Materials only. 1½in.	2in.	2½in.	3in.
P. Trap	1/9	2/6	3/9	4/3
S. ,,	2/2	2/10	4/3	5/6
Running (No. 15)	1/9	2/6	3/9	—

Fixed complete, including profit.

2in. S lead traps, with screws 5/6 — 3in. lead traps, with screws 10/10
2½in. S do. do. 7/8 — 4in. S do. do. 13/6



	£	s.	d.
W.C. Closet Pans—			
Pedestal Closet Pans, S or P trap, cane and white, from	0	16	6
Ditto do. do. fancy print, from ..	1	5	0
Closet Pan and Trap, jointed, cane and white, from ..	0	10	0
Closet Seats—			
Cherry or pine stained, 7/–; oak, without covers ..	0	8	6
Ditto with cast iron levers and weights	0	13	6
Ditto with covers, extra	0	3	0
Add **Plumber's Labour** and cement to fixing pan ..	0	3	6
,, ,, ,, Cistern and waste	0	5	0

CLOSETS.

For non-Sewered Situations—			
Farmers' Sanitary Pan	4	0	0
The "Conqueror" Portable Oil Closet, 25in. x 20in. x 20in., weight 96lbs.	3	15	0
Liquid "Killsmel," 4/– per gal. X supply 8 months.			
Gal. iron Soil Pans, pitched inside, each 4/6.			

SANITARY.

LAVATORY RANGES.

Strong Massive White Glazed Fire-clay "York" Lavatory Ranges, with overlap joints, fitted with ½in. Upright Plated Pillar Cocks, 1¼in. Washers and Plugs, Staples and Chains, and Cast Iron Brackets, with floor supports or Cast Iron Cantilevers, for building into wall, per basin, £3/12/6.

Enamel Iron "Bromsgrove" Lavatories, fitted the same as above per basin, £2/15/–.

Lavatory Basins—

Angular Lavatory Basins, from 1 1 0
Square and Oval, according to size and design, from .. 1 6 0
Frames and Brackets for supporting above, from 4/6 to 10/– each; Pillar tap, 5/–.
Corner Pedestal Lavatory Basins, porcelain white with nickel, plug, 31in. high, 27in. x 20in. over all, fixed com. 3 12 6
Flat Back Pedestal Lavatory Basin, 28in. x 23in. over all, tap and plug .. .. fixed complete 4 5 0

Labour only—

Carpenter's wages, fixing Basin on 2 Brackets, 3 hours, at 1/6 .. .. net 0 4 6
Plumber's wages, fixing Lead Trap and Pillar Cock, 4 hours at 1/4½ .. .. net 0 5 6

URINALS.

Fireclay White Glazed "Federal" Urinals, with fire-clay cistern and polished copper pipes, per stall, £9/10/– to £10/10/–.

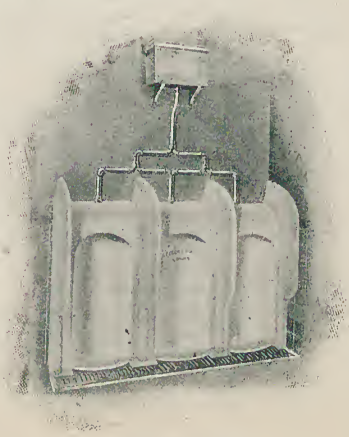
Single Flat Back, without lip, 13in. wide, white glazed, each 10/6 to 21/–.

Single Flat Back, with lip, 14½in. wide, white glazed, each 15/6; angular, 17/6.

ESTIMATE FOR WATER CLOSET.

	£	s.	d.
Pedestal Closet ..	0	14	0
Oak Seat, single flap	0	7	0
20gal. Cistern ..	0	10	6
1½in. Flush Pipe, lead	0	4	6
½in. Ball Stop Cock ..	0	2	6
Lever and Chain ..	0	1	6
12ft. ½in. Connecting Water Pipe, at 4d.	0	4	0
12ft. 2in. Vent Pipe, fixed, at 4d. ..	0	4	0
Ventilating Cowl, fixed	0	2	0
	2	16	0
Plumber's labour ..	1	19	0
Approximate net cost	4	15	0

If on 1st floor, add for cast iron and lead soil pipes, &c.



Stall Urinals.

CISTERNS.

W.C. Cisterns (unfixed)— (Sydney Prices). £ s. d.

Zinc, 10gal., 12 gauge zinc 1 5 0
"Clemen's" Patent Automatic, 10gal. 2 5 0
Cistern, gal. iron 15gal. 2 10 0
Fire-clay Cistern, Urinal, 5gal. 2 5 0
Copper Urinal Cistern, 2gal. 2 10 0
"Speedwell" glass, enamel, 2 gal. 2 5 0
Fire-clay Cistern, "Regal," with bracket chain, 2gal. 3 15 0
Gal. Iron, "Murphy's" Patent, with overflow, pitch painted inside, 24gal., each 0 16 0
7ft. Flush Pipe, for above, 1½in. diam. 0 4 6
"Murphy's" Patent, 4 flush cast iron cistern, glass lined, 30in. x 16in. 3 10 0

(Melbourne Prices.)	Painted. £ s. d.	Glass Ena. £ s. d.
3gal. "Levern" Cisterns	1 3 6	1 8 6
2gal. ,, ,, ...	1 5 0	1 10 0
1gal. ,, ,, ...	1 2 6	1 7 6
3gal. "Rotunda," silent and most effective		2 10 0

Silent arrangement, with cover extra, for "Levern" Cisterns, 6/6 extra. Covers, extra, 3/–.

Automatic Cisterns—	Painted. £ s. d.	Glass Ena. £ s. d.
4gal.	1 2 6	1 17 6
3gal.	1 10 0	1 15 0
2gal.	1 7 6	1 12 6
1gal.	1 5 0	1 10 0

LAUNDRY TUBS, etc.

Galvanised Iron Tubs to be fixed—	2 comparts.	3 comparts.
26 gauge	16/–	20/–
24 gauge	18/6	22/–
Wood Laundry Tubs	30/–	40/–

Fire-clay Laundry Tubs— £ s. d.

20 x 16 inside, 2 compartments 7 10 0
21 x 16 inside, 2 compartments, with back and flanges 13 0 0

SINKS.

Porcelain Enamelled Cast Iron Sinks, with Plug and Washer—

Inside measurement, inches	15	18	21	24	27	30
Net prices, each	14/–	16/–	18/–	20/–	23/–	26/–

Fire Clay Sinks, White Glazed inside, Cane Glazed outside—
Outside measurements—
21in. long x 15in. wide x 8½in. deep, with plug and washer 25/–
24in. long x 15in. wide x 8½in. deep 28/–
27in. long x 17in. wide x 9in. deep 37/6

LAUNDRY COPPERS.

Seamless Cold Drawn— Gallons	10	12	14	16	18	20
Copper Boilers	15/–	16/–	18/–	—	—	—
Heavy Gauge	19	23	26	30	33	37

Fortable Self Setting Iron Frame, 2ft. diam., fitted with gas-ring, 12gal. tinned copper boiler £4 10 0

(Built in coppers, *see* Bricklayer.)

BATHS ONLY.

(Trade Price.)

Galvanised Iron Baths, strongly stayed, with 2½in. brass plug and washer.

	5ft.	5½ft.	6ft.
	s. d.	s. d.	s. d.
62 gauge iron	14 3	15 9	17 0
24 „ „	17 3	18 9	19 9

Galvanised Iron Baths, flanged for casing in, 1/6 less than the above prices.

Cast Iron Bath, Self Setting—Size, 5ft. 9½in. long ; 2ft. 5in. wide ; 1ft. 8½in. high ; American pattern, with fixed feet, with plug and washer, without overflow .. £3 to £4

Galvanised Steel Enamelled Bath—Size, 6ft. 1in. ; 2ft. 4½in. ; 1ft. 11in. high 4 coats of enamel inside, oak rim .. £4

Galvanised Iron Baths, Self Setting—Very strong, with rolled edge on legs, plug and washer, complete, 5½ft. 50/– ; 6ft. £3

Paint Enamelled Iron Baths, French pattern, fitted with nickel-plated waste and overflow, with strong brass elbow union, all ready for pipes and plumbers' connections .. .. £2/10/– to £3

1st class **Porcelain Enamelled Bath**, with all connections in ornamental brass, and pipes complete .. .. £6 to £12

2nd class **Porcelain Enamelled Bath**, with all connections in ornamental brass, and pipes complete £4/10/– to £5/10/–

SHOWER.

"Paragon" Bath, spray and shower, glass screen £37 to £55

Copper Shower Heads, for fixing over baths—

6in.	7in.	8in.	10in.	12in.
2/6	3/–	3/6	4/9	8/–

Bath Screen, to fix on rim of bath, gal. iron, 1in. coir, 5ft. high x 2ft. 6in. sides and back 2 8 0

Bath Screens and Fittings—

	£	s.	d.
White Enamelled Corrugated Bath Screen	2	15	0
White Enamelled Plain Bath Screen	3	0	0
Nickel plated Shower and Tap fitted to Bath Screen ..	2	5	0
Nickel-plated Spray and Shower fitted to Screen, with hot and cold fitting	11	0	0
Hot and Cold ¾in. Nickel-plated Pillar Taps, fitted to bath, per pair	1	10	0
Galvanised Ring and Waterproof Curtain	1	15	0
Nickel-plated Ring and Waterproof Curtain	2	10	6
Nickel-plated Showers, from	0	7	6
Rubber Bath Mats .. ..10/– to	0	18	0

HOT WATER FITTER.

The Combined System is the cylinder and the tank system in one. The combination is claimed to overcome dangerous conditions which might arise if the tank system was emptied when the water supply failed. It also produces a better flow at the high taps. The reverse is sometimes associated with the cylinder system when used alone.

The Modern Gas Radiators have simplified and cheapened heating to such an extent that the **old systems** are becoming less used.

See Heating Section for prices.

WATER HEATERS.

Califont Heaters (Ewart's) deliver at once a supply of hot water by the simple action of turning the hot water tap when required. They will stand a water pressure of 150lbs. per square inch, and are entirely automatic in action. Sizes, from 2 to 16gals. of hot water per minute. The prices range from £12/10/–.

Household Geysers (Ewart's) on the Sealed System give good results and cost, with enamelled brackets, from £5.

"Radion" Gas Heating Circulators and Cylinders (Ewart's) can be fixed to existing hot water circulating system, or as heating radiators for private houses, and other heating. They are fitted with an automatic **thermostatic valve**, which turn on or off the gas and keeps the temperature of the water constant. Price from £8/10/– upwards.

Melbourne and Sydney agents, *see* advt., pages 10 and 31.

Brass Cocks, etc., for Water or Steam.

Exclusive of fixing. Each—	½in.	¾in.	1in.	1¼in.	1½in.
	s. d.	s. d.	s. d.	s. d.	s. d.
Square way, bib, or stop cocks	4 0	6 0	8 6	15 0	18 0
Round way cocks	5 0	7 6	10 0	18 0	22 0
Range boiler cocks with screw bottom	5 6	7 6	10 6	—	—
High pressure bib or stop cocks	4 6	6 0	9 6	25 0	35 0
Brass tubing, at 1/9 per lb.	0 9	1 0	1 4	1 8	2 0

N.B.—If for more than one item deduct 15 per cent. from the above prices.

Material only.

Gal. Wrought Iron Steam Pipes and Fittings, 1st quality, 60 per cent. off Trade List.

Gal. Wrought Iron Hot Water Tanks, 3/16in. thick plate—20gals. capacity, £5; 30, £7/10/–; 50, £10; 100, £17/10/–.

Gal. Plate Iron Circulating Cylinders—20gals. capacity, £6; 30, £7/10/–; 40, £9; 50, £11/10/–.

Pat. Steam Traps, "Heintz"—½in. pipes, £1/9/–; ¾in., £1/17/–; 1in., £2/5/–; 1in., £2/12/–.

Labour only.

Reckon from 4d. to 8d. per foot run for fixing pipes.

Fixing Cylinder Tanks on brackets, &c., to be added.

GUN METAL FITTINGS (Each).

	Ts.	Elbows.	Sockets.	Unions.	Nipples.
	s. d.	s. d.	s. d.	s. d.	s. d.
½in. pipe ..	0 10	0 7	0 5	2 0	0 7
¾in. „ ..	1 3	1 0	0 9	2 3	0 10
1in. „ ..	2 2	1 10	1 4	3 3	1 2
1¼in. „ ..	2 4	2 2	2 0	4 9	2 0

BOILERS AND CISTERNS.

(Hot and Cold.)

	£	s.	d.
High pressure boilers, for kitchen range, to supply hot water, fixed from .. .. £5 to	7	0	0
Hot and cold water cisterns to supply bath, lavatory, kitchen, and wash house, from .. .. £6 to	10	0	0
Copper shower and stop cock for same	0	10	6
Cold water tap and hot water tap, $\frac{3}{4}$in., each	0	7	6
Marble Baths, full size, with brass connections for supply, waste, and overflow pipes	12	0	0

COPPER CYLINDERS.

Capacity.	Height.	Diameter.	£	s.	d.
20gal.	36	x 15	4	15	0
25gal.	43	x 15	5	5	0
30gal.	52	x 15	7	0	0
40gal.	52	x 17	8	10	0
50gal.	52	x 19	10	0	0
75gal.	52	x 23	12	15	0

COPPER SHOE BOILERS.

Width.	Height.	Height of Toe.	Price. £	s.	d.
12	x 22	x 8in.	5	5	0
14	x 22	x 8in.	6	10	0
16	x 22	x 8in.	8	5	0
18	x 22	x 8in.	9	5	0

Flue through Toe, £1 extra.

COPPER SADDLE BOILERS.

Width.	Height.	Depth.	£	s.	d.
20in.	15in.	18in.	7	0	0
20in.	15in.	24in.	9	10	0
20in.	15in.	30in.	10	15	0

WROUGHT-IRON PIPES, PER FOOT.

Thickness of Iron.

Bore Ins.	in. 1-16 lb.	in. $\frac{1}{8}$ lb.	in. 3-16 lb.	in. $\frac{1}{4}$ lb.	in. 5-16 lb.
$\frac{3}{8}$	·3	·7	1·1	..	..
$\frac{1}{2}$	·4	·83	1·4	2·0	..
$\frac{5}{8}$	·46	1·1	1.6	2·3	3·1
$\frac{3}{4}$	·54	1·2	1·9	2.6	3·5
$\frac{7}{8}$	·6	1·3	2·1	2·9	3·9
1	·7	1.5	2·4	3·3	4 3
$1\frac{1}{4}$	·87	1·8	2·9	3·9	5·2
$1\frac{1}{2}$	1·0	2·1	3·3	4·7	5·9
$1\frac{3}{4}$	1·2	2·5	3·8	5·3	6·8
2	1·4	2·8	4·3	5·9	7·6
$2\frac{1}{3}$	1·7	3·5	5·3	7·3	9·3
3	2·03	4 1	6·3	8·6	10·9
$3\frac{1}{2}$	2·34	4·7	7·3	9·8	12·5

COPPER PIPE.

The Weight of a Foot in length.

Thickness.	in. $\frac{1}{16}$ lb.	in. $\frac{1}{8}$ lb.	in. $\frac{3}{16}$ lb.	in. $\frac{1}{4}$ lb.
$\frac{1}{2}$ in.	0·42	·94	1·60	2·27
$\frac{5}{8}$	0·52	1·14	1·79	2·65
$\frac{3}{4}$	0·62	1·33	2·17	3·02
$\frac{7}{8}$	0·71	1·51	2·45	3·40
1	0·80	1·69	2·73	3·77
$1\frac{1}{4}$	1·00	2·08	3·29	4·50
$1\frac{1}{2}$	1·15	2·42	3·85	5·30
$1\frac{3}{4}$	1·40	2·87	4·48	6·08
2	1·53	3·21	5·00	6·80
$2\frac{1}{4}$	1·74	3·58	5·56	7·55
$2\frac{1}{2}$	1·94	3·97	6·14	8·31
$2\frac{3}{4}$	2·09	4·34	6·73	9·12
3	2·27	4·78	7·30	9·82

FLEXIBLE METALLIC TUBING.

For Gas, Water, Steam or Oil.

Bronze No. 2.

Size	½in.	¾in.	1in.	1¼in.	1½in.
Price, per foot	4/–	5/8	7/–	8/6	11/3
Connections for same, each	4/6	9/6	11/3	13/–	13/9

Steel No. 2.

Size	⅜in.	½in.	⅝in.	¾in.	1in.	1¼in.	1½in
Price, per foot	1/3	1/6	2/–	2/3	2/6	3/6	4/6
Connect. for same, each	2/9	3/3	4/3	5/3	6/9	10/6	13/9

Hannan's Water Heaters, for wood, fuel, chips, or gas to 3gals. per minute .. .. £4 to 7 10 0

Fletcher " Spray," 2 gals. per minute to 120 degrees .. 3 10 0

" " 3 gals. per minute to 120 degrees .. 4 10 0

" with shower attachment 5 10 0

Brandt Bros. " Non-Contact " Bath Water Heater .. 6 10 0

Made in copper. If in iron 20/– cheaper.

Danks' Ideal Hot Water System—

Heater, self-contained Boiler and Cylinder, from .. 3 0 0

See advt., pages 28 and 31.

For Doctors—Small Lavatory Basin Heater, from £3 3 0

Brant's Kerosene Bath Heater, from 4 15 0

SHEEP TROUGHING.

(*See Manufacturer's advt., page* 29).

Trough, 18in. wide, 10in. deep (22 gauge gal. iron); capacity, 6 gals. of water per foot; height, 14in. Weight of each 6ft. length, including bands and stand, 36½lbs.

Prices of complete Troughs, with Stands and Bands—

	£ s. d.		£ s. d.
6ft. Trough ..	1 3 0	60ft. Trough ..	5 17 6
12ft. ,, ...	1 13 6	78ft. ,, ...	7 9 0
18ft. ,, ...	2 4 0	90ft. ,, ...	8 10 0
24ft. ,, ...	2 14 6	102ft. ,, ...	9 11 0
30ft. ,, ...	3 5 0	150ft. ,, ...	13 15 0
42ft. ,, ...	4 6 0	204ft. ,, ...	18 10 0

Lead Required to Caulk Iron Spigot and Socket Pipes—

lbs. per Joint.

Interior Diameter of Pipe.	Length of Socket, inside measure.	Weight of Lead per Joint.	Depth of Lead in inches.
in.	in.	lbs.	in.
1½	2½	1¼	1⅜
2	3	1¾	1½
2½	3	2¼	1⅝
3	3	2¾	1⅝
4	4	4	1¾
5	4	5½	1⅞
6	4	7	2

ROOF-SLATER, TILER, SHINGLER.

Award Wages, 1/6 per hour.

SLATING, PER SQUARE.

Measurement, if not otherwise stipulated.

Take the net measurement of area covered.

Add the length of the eaves by 1 foot wide.

Add the length of all cuttings to hips, valleys, dormers, chimneys, etc., by 6 inches wide.

The battens generally specified are 2in. x 1in. deal; if wider they are apt to curl up with the heat and loosen the slates.

Spacing.—Battens for slates and shingles require the same distance apart, centre to centre, that the width of slates exposed show when laid.

To find the number of battens to length of rafter:—The lap or cover of slates, etc., varies according to material used and pitch of roof to be covered.

The following table is reckoned for a 3½in. lap—that usually specified.

If the slates fit closely, 2½ inch lap is sufficient. The larger the lap the more the slates *cock up*. When the slates do not fit closely, the roofs require *pargetting* or *rendering* in lime and hair mortar.

Allowing that 2½in. lap is sufficient for a Gothic roof of 60 deg., then 3in. lap should be used for a square roof, 3½in. for a third pitch, and 4in. lap for a quarter pitch roof.

The *cuttings* next hips and ridges are generally bedded in mortar.

SLATES AND BATTENS REQUIRED PER SQUARE.

Laid with a 3½in. lap or cover.

Weight per square, about 6 cwt.

	Weight per 1000 cwt.	Number required per square.	Battens per square foot run.	Labour and Nails 3½ lap	Labour and Nails 4½ lap.
Duchess, 24 x 12 ..	50	120	120	7/–	6/–
Countess, 20 x 10 ..	33⅜	180	150	8/–	7/–
Viscountess, 18 x 10	30	208	175	9/–	8/–
Ladies, 16 x 8 ..	20⅞	300	200	10/–	9/–

Eaves or cuttings to waste must be allowed for.

Circular slating, one-third to one-fourth extra for labour, but for materials according to actual waste in radiating the sides, etc.

For **fancy cut slating,** reckon from one-third to twice more for the labour, which includes nailing on the battens.

For stripping roofs, reckon one-half the given prices, for "Labour and metal nails."

Rendering or pargetting slate joints, per foot run, about 1d.

Ditto do. in lime and hair mortar, per square, 10/–.

Bedding, Hips and Ridges, per foot run, 2½d.

Cutting through slate roof for 4 inch gal. iron **vent pipe,** and making good with slates and lead apron, 5/–.

	s.	d.
Mitred slate hips, with "soakers" bedded, over waterproof felt	1	3
If under-bedded with 3lb. lead soakers per foot run	1	9

METHOD FOR MEASURING.

If the roof is **plain and unbroken**, take the length of the longest eave, and multiply it by length of rafter, double for both sides of roof. Gables and hip roofs measure alike, but add extra for projection of gable ; also extra for the cutting of hips.

For broken roofs of the same pitch throughout, reckon the whole area as one roof, and allow extra for cutting valleys, hips, and ridges.

In irregular pitched roofs measure the eaves in sections, and multiply by the different lengths of the rafter above each section.

SLATES per 1000.

The prices of slates vary according to tariff and supply. The present prices per 1000 are :—

Countess slates, 20 x 10, red and blue, Bangor, £16/10/–.

Penrhyn, purple, Bangor, 20 x 10, £17.

Port Madoc, blue, £12/10/–; American slates, blue, £12 ; Eureka, green, £15.

Dampcourse slate, thick, 14in. x 9in., £7 per 1000
Ditto do. 18in. x 9in., £9/10/– per 1000.

Estimated cost of Slate roof per square.

Bangor Slates, 20 x 10, at £16 per 1000—

	£	s.	d.
Slates, 180 per square	2	17	7
Battens, 150ft. run, 2 x 1 =25 sup. ft. at 18/–	0	4	6
Nails, 6d. ; and 2lb. slate compo. nails, 1/–	0	1	6
Labour to slates and battens	0	7	0
Net	£3	10	7

ASBESTOS CEMENT SLATES.

Fibro Cement Slates were the first **Asbestos-Cement Slates** imported. Now there are several makes under different trade names, viz., " Eternit," " Fibro-Cement." " Poilite," " Uralite," made about 16in. x 16in. x 3/16in. thick. (*See* advt., pages 9, 39, 43).

Asbestos-Cement Slates, size 16in. x 16in. x 3/16, are fixed diagonally with gal. clouts at 3 corners with a 4in. lap.

1,000 covers 10 squares, and weigh, packed, 6½ cwt.

Labour laying per square, 7/–.

Asbestos—Cement.

Special Asbestos Cement Cold-water Paint, various colours, is made in paste form, in 7lb. tins. 1lb. covers 8 squares. *See* Painter.

Fibro cement slates, 16in. x 16in. (asbestos and cement).

For quantities see advt. page 9.

TERRA COTTA ROOFING.

This cheerful and picturesque roofing material is very suitable for our bright and warm climate, as it is much cooler than slates, although slightly heavier. It does not necessitate any alteration in the construction of roof supporting timbers.

The weight of Tiles (Marseilles pattern) is about 7cwt. to the square when laid.

1000 Tiles weigh 2¾ tons.

The shingle pattern tile is also made with fancy cut edges, suitable for ornamenting small roofs, over porches, dormer windows, balconettes, and projecting window shades.

It is not advisable to have the pitch of roofs too flat, owing to the collection of dust and moisture, which in course of time will discolour the tiles.

BEDDING AND POINTING UP

100 feet run of Terra Cotta Ridge Tiling.

Material required.—Bedding: 2 cubic feet lime and hair mortar. **Pointing up:** 1 cubic foot cement mortar and 2lbs. of red oxide for coloring.

Labour: Tiler, bedding and Pointing 150 feet run of tile ridging and hips is 2 days.

ROOF TILING AND SHINGLING.

Terra Cotta Tiles (French pattern), weight 2¾ tons per 1,000, £12 to £13 per 1,000.

Requiring 127 tiles per square.

1,000 tiles cover nearly 8 squares.

Requiring 90 feet run of 2 x 1 battens.

Terra Cotta Shingle Tiles, per 1,000 £3/10/– to £4.

Requiring 550tiles per square.

280 feet run battens.

Glass Roofing Tiles, to match, Marseilles pattern, each 2/6.

Ridges.—Terra Cotta, plain, per foot, 4d. to 8d. Battlement Ridges per foot, 1/–. Crests, each, 7d. Starter, each, 1/–. Bargeboards, straight lengths, per foot, 1/6. End pieces, each, 2/6. Plain Bargeboard Finials, for roof, each 5/– to 9/–. 12in. Swan neck gables, 4/6. End Rolls, 5/–. Gable Stop Ends, 1/–. Angle Tiles, 6d. Double Hips, 1/6.

Sydney, Melbourne and Adelaide Prices of Marseilles Tiles, range from, per sq., 45/– to 55/–, fixed on roof, including battens and wire.

SHERWOOD EARTHERNWARE ROOF TILES.

Sherwood Shingle Tiles. A hard baked plastic Tile (*wire cut*), size 10½ x 6 x ½in. thick. Color, dark-red, brown, and purple. Hip and ridge Tiles cut for mitreing.

Number of Tiles and Battens requiredper square—550 Tiles, per square. And 280 feet run, 2in. x 1in. battens.

Price, per 1,000, on rail, £3/10/–.

Labour, battening and laying, per square, 10/–.

SHINGLING.

Material per square.

Metal Shingles, stamped zinc, per square laid from £2/14/-. *See* details and prices, " Metal Worker."
Redwood Shingles, per bundle, 7/-.
Oak Shingles, 15 x 3½, 8 bundles cover 100 sq. feet. Price, 3/6 per bundle ; £1/8/- per 100 sq. feet.
Redwood Shingling, 4 bundles cover 100 sq. feet, at 7/-, £1/8/-.
Number of Shingles a good tradesman should lay per day of 8 hours :—
Shingles on a roof, 2000 to 3200.
Shingles on walls, 1500 to 2000.

NUMBER OF SHINGLES OR SHINGLE TILES.

Required to cover a square, stating average width of shingle and length exposed to weather, or width of rows seen.

Width of Rows seen. Inches.	Width of Shingle. 4in.	6in.	1000 Shingles will cover ft. 4in. Shingle. sq. ft.	6in. Shingle. sq. ft.
4	900	600	110	168
5	725	485	140	210
6	605	405	167	250
7	515	345	195	292
8	451	306	225	335

Labour per square and Battens required.

	Labour.	Battens.
Metal Shingles, from	5/6	100
Slates, 20 x 10	7/-	150
Asbestos Cement Slates	6/6	150
Redwood Shingles	8/-	190
Oak Shingles, 15 x 3½	9/-	210
Shingle Tiles	9/-	190
Tiles, French pattern	5/-	90

Wall or Gable, add 30 per cent. for labour.
Half 5ft. Palings, 100 per square 4/-

Vulcantile is an **Asphalt Felt Roofing** shaped-like Tile, made in rolls 25½ins. wide, containing 2 shaped strips, various colours, light and dark grey, terracotta, brown and green, covered with crushed silica, and coloured quartz and rock crystals, producing a glistening surface.

Four rolls, with a 4in. lap (equalling 3 thicknesses) will cover 100 sq. feet or one square, and weighs 200lbs. To be nailed on lining board, or even surfaces, with ⅝in. copper clouts, suitable for hoods. Labour laying per square, 4/6.

Kaloroid is a coloured asphalt felt roofing. *See* Asphalte Section.

Zinc Tile Roofing.

The ornamental zinc tile roofing is very light, and can be used with advantage in covering steeples, pinnacle roofs, mansard roofs, and other steeply pitched constructions, or where weight has to be considered.

(*See* Metal Worker for particulars.)

GENERAL ROOFING ESTIMATES.

Labour and covers per square.

	£	s.	d.
Galvanised Iron, at £19 per ton, or 19/– per cwt.—			
1⅛ cwt. per square, 26 gauge	1	1	6
Labour, laying iron, 3/6 ; screws and washers, 6d. ..	0	4	0
Rafters, 2ft. spaced, 6—10's=60ft. run, 4 x 2, at 12/–	0	5	0
Labour, cutting rafters and fixing battens, 2/9, and nails	0	3	9
3 x 1½in. battens, 2ft. 6in. apart=50ft. at 7/6 per 100	0	3	9
Gal. iron and rafters, net price ..	£1	19	0
Redwood Shingles, at 7/– per bundle, 4 bundle shingles per square, at 7/–	1	8	0
Battens, 190 feet run, 2 x 1, at 18/–; nails	0	6	9
Labour, shingling, 8/–; battens, 2/–; nails, 2/6 ..	0	12	6
	£2	6	0
Forest oak shingles and battens, net	2	10	0

RAFTERS TO THE SQUARE.

	£	s.	d.
Oregon Rafters, plain gable roof, spaced 18in. apart, 8—10's =80ft. 4 x 2, at 18/– per 100	0	12	0
Labour, cutting, hauling and fixing, 4/6 ; nails, 6d. ..	0	5	0
Net ..	£0	17	0
Add extra for hips, waste and profit.			
Terra Cotta Tiles, French pattern, £10 per 1000—			
Tiles, 130 per square=20/– per 100	1	12	3
Battens, 90ft. run, 2 x 1 oregon ; nails	0	3	0
Labour to tiles, 5/–; battens, 1/3 ; 1lb. copper wire 1/6	0	7	9
	£2	3	0
Rafters as above to be added	0	17	0
Net	£3	0	0

	£	s.	d.
Fibro-Cement and Asbestos-Cement Slates, 16 x 16in.—4in. lap, laid diagonally. 100 Slates (Greys) cover 1 square.			
100 Slates, Grey	1	17	0
Crampons and nails	0	2	4
Labor (expert), per square	0	6	6
150ft. 2 x 1, and batten nails	0	5	8
Net	£2	11	6
Stamped Metal Shingling, about	£2	14	0

TERRA COTTA.

Terra Cotta Lumber is used for fire-proof ceilings, floors, girder casing, column casing, and partitions. The shape and size of lumber varies in every instance, and in some cases it may be advantageous to use lumber designed on the interlocking pattern.

Terra Cotta Lumber is made either hard and strong, or soft and light, to suit required conditions.

These hollow blocks are much lighter than solid brickwork, and therefore especially adapted for arches ; its crushing weight is said to be 840lbs. per square inch, and will effectually resist the joint assault of fire and water. It will also readily receive nails driven into it for slating, etc., without the use of the usual wooden battens.

Terra Cotta Lumber, delivered on site in city, or Liverpool.

WALLING.

Size Thick.	Price sq. yd. City.	On rail at wks. L'pool.	Weight sq. yd.	Size of Block.	Description.	Labour and Cement.
in.	s.	s.	lbs.	in.		s.
2	2/7	2/4	120	12 x 6	Interlocking	1/11
2½	2/8	2/5	130	15 x 9¾	,,	1/11
3	2/10	2/8	155	,,	,,	2/–
4	3/2	2/9	190	,,	,,	2/1
4½	3/6	3/–	200	,,	Plain	2/1
6	4/2	3/7	250	,,	,,	2/5
9	6/6	–	–	—	—	4/6

Melbourne Prices—Terra Cotta Lumber, 12 x 6 x 4½in., per sq. yd. 4 3

FLOORING (material only).

6in. deep x 6in. wide, per sq. yd.	6 6
8in. deep x 6in. wide, per sq. yd.	8 0
10in. deep x 6in. wide, per sq. yd.	9 0
12in. deep x 6in. wide, per sq. yd.	10 6
Add—	
Centreing 2/–; cement, 3 to 1, 1/–	3 0
Labour, laying, from per sq. yd.	4 0

Add Cartage to work and hoisting, per floor.

Partition Bricks, per 1000, at works .. .. 30/– to 40/–

Labour, laying, from 30/– per 1000.

Chimney Pots, red or buff, 10in. to 17in. high .. 4/6 to 6/–

Ditto, Octagon, round and fluted, 22in. to 27in. high 6/– to 7/6

Add extra for Windguard, 1/– Blowers, 1/8 ; V. Caps to pot, 3/– each.

Glazed Earthenware Pots, similar designs and prices.

Fixing cement, 2/– extra.

TILER.

WALL AND FLOOR TILES.—Labour Only, Piecework.

Tilers Award, 1910, 9/– to 10/– per day.

Dados, including capping skirting	3/9 to 5/–
Encaustic and Mosiac	3/– to 4/–
Floor and verandah, with or without border, 6 x 6	1/9 to 2/6
6 x 4¼ Octagon and 6 x 3, pattern with ordinary borders	2/– to 2/3
If less than 4 yards, add	3d.
Hexagon, 1in. and 1½in.	3/6
Hearths only 1/6 to 2/6; Hearths and covings	17/6 to 20/–
Hearths, side panels for interior grate	10/–
Hearth surrounds, including brick work	12/6
Hearths, splayed surrounds and square facings	15/–
Moulded Tiles and angle bends, per foot run	1½d. to 2d.
Nosings, marble and slate, to ver. ft. run	3d.
Opalite or other glass tiling, 6 x 6 or 9 x 3, 10 yards	2/9 to 3/3
Wall Tiling	3/– to 3/3
If panels inserted, extra	1/– to 2/6
G.E. Paving Tiles, 12in. x 6in., per 100	25/–
Commonwealth Pat. Mosiac Coloured Cement Tiles, for Paving, size 8in. x 8in. x ⅝in., fancy designs, per yard	7/–
Ditto do. do. plain design	6/–
Insert Letters also made in these tiles, each	6d.
Labour, laying, for above	2/–

HEARTHS AND TILE PAVING.

Material Only.—Exclusive of Laying.

Verandah or Floor Tiling in plain colours, per sq. yd., from	6/6
Ditto, in selected designs, with encaustic, blue, green white, etc. per sq. yd., from	8/6 to 15/–
Hearths, 4ft. x 1ft. 3in., each, from	7/6
Fancy Majolica Tiles, panel designs, from	7/6 to 10/6
Plain printed Glazed Tiles, 6 x 6, per doz., 3/–; per sq. yard	9/–
Coloured Glazed Tiles, 6 x 6, per doz., 4/–; per sq. yard	12/–
Panels for Grates, 30in. x 6in., artistic designs, pair	5/– to 13/–

Wall Tiling.

Wall Glazed White, 6 x 6, and 6 x 3, per sq. yard	7/6
Wall Tiling, in 6 x 6 or 6 x 3, best quality white glazed, per square yard	9/–
Plain Enamelled Tiles, in blood red, old gold, dark and light green, light and dark blue, peacock, etc., 6in. x 2in., and 6in. x 3in., tiles, per hearth, each	10/6 to 15/6
Ditto do. and filling on walls, per sq. yard, from	14/– to 25/–
Dadoes, in rich colours, according to selection, per sq. yard	17/6 to 35/–
Skirting, 6in. x 6in., suitable for lavatories and bath-rooms, 7/6; Ditto, in special colours, per doz.	9/6
Moulding and Capping, in brown, 4/6; in special colours per doz.	5/6
Fancy Majolica, per doz.	5/– to 7/–
Faience Work, "Bas" or "Pan-relief," in all designs, glazed or unglazed, from, per yard	£3 to £5

Terra Cotta Wall Tiles—Wall facing tiles, diaper pattern, 9 x 9 x $\frac{5}{8}$, 1/–. Ditto, other patterns, 6 x 6, 6d.

Terra Cotta Floor Tiles, 8 x 8 x $\frac{5}{8}$, per 100, 17/6.
Number required per sq. yard, 20$\frac{1}{4}$; per 100 sq. ft., 225.

Enamelled Tiles, or "Briquettes," chamfered, all colours, suitable for fireplaces, 6 x 3 and 6 x 2, per yard, 15/– to 25/–.

Marble (Fender) Kerbs for Hearths—	3in. x 2in.	4in. x 3in.
White Sicilian, round top or chamfered ..	17/6	27/6
St. Anne's or Rouge	22/6	30/–

O.G. or Moulded Pattern, 5/– to 10/– extra per fender.

PATENT TILING AND WALLING.

There are several Seagliola and other imitation marbles of chemical composition, said to have the natural and artistic properties of real marble. Most rare and expensive marbles, granites and mosaics are represented in this material. The markings go right through the material.

Cost, the same as tiles, per sq. yard, from 8/–
Labour—Price for fixing Floors, Halls, per sq. yard, from .. 1/–

Ceramic Mosiac Tiling is composed of small circular, square, and octagon vitrified porcelain tiles about $\frac{3}{4}$-inch x $\frac{1}{4}$-inch thick, formed into numerous designs and mounted upside down on paper similar to other mosaics. They are laid on the prepared cement bed with the paper surface upwards. The paper being removed after the mosaic is in position.

Ceramic Mosaic Tiles, per sq. yard .. .. 12/6 to 17/6

TILES REQUIRED PER SQUARE YARD.

Size Tile.	Number Required.	Size Tile.	Number Required.	Size Tile.	Number Required
15 x 15in.	5$\frac{3}{4}$	6 x 4in.	54	4 x 2in.	162
12 x 12in.	9	6 x 3in.	72	4 x 1$\frac{1}{2}$in.	216
10 x 10in.	13	6 x 2in.	108	4 x 1in.	324
9 x 9in.	16	6 x 1$\frac{1}{2}$in.	144	3 x 3in.	144
8 x 8in.	20$\frac{1}{4}$	6 x 1in.	216	3 x 1$\frac{1}{2}$in.	288
7 x 7in.	26$\frac{1}{2}$	4$\frac{1}{2}$ x 4$\frac{1}{2}$	64	3 x 1in.	432
6 x 6in.	36	4 x 4in.	81	2 x 2in.	324
5 x 5in.	52	4 x 3in.	108		

1 bag Cement, 125lbs., with 3 bags of sand, will bed 6$\frac{1}{4}$ square yards $\frac{3}{4}$in. thick. (*See* Plasterers).

OPALITE WALL TILING.

Opal Glass Tiling, apart from the ordinary white and tinted kinds, is enamelled in a variety of colours, plain and decorative, suitable for dadoes, friezes, wall fillings, sanitary and reflective light walls, etc.

Stock Sizes, Unfixed.

White Tiles, 9 x 3, 9 x 4, 6 x 3, per yard super. 7/4
Tinted in colours, or marbled, mottled, Granitic patterns .. 9/6
Decorative borders, freizes, dadoes, 3d. per inch, per foot. Thus a 3in. border costs 9d., and a 4in. costs 1/–.
Extra for fixing, with the company's special cement, per yard .. 2/6

WIRE WORKER.

Woven sheets less than 4ft. super. are charged by the piece, widths of less than 1ft. are charged as 1ft.

List prices are reckoned at the present price of wire; but for general use as a guide, the quotations are as under.

Fixing to be added.

STRAIGHT WIRE LATTICE.

Per foot super.

Size of mesh.	Galvanised. No. 15 gauge.	No. 14 gauge.	No. 13 gauge.	Plain Iron. No. 15 gauge.	No. 14 gauge.	No. 13 gauge.
¼in. ..	9d.	11d.	1/–	8d.	10d.	11d.
⅜in. ..	7½d.	8½d.	9d.	6½d.	7½d.	8½d.
7/16in. ..	6½d.	7½d.	8d.	5½d.	6½d.	7½d.
½in. ..	5d.	6d.	7d.	4d.	5d.	6d.
⅝in. ..	—	5d.	6d.	—	4d.	5d.
¾in. ..	—	—	5d.	—	—	4d.

CRIMPLED WIRE DIAMOND LATTICE.

Per foot super.

Galvanised or Painted.

Size of Mesh.	No. 14 gauge.	No. 13 gauge.	No. 12 gauge.	No. 11 gauge.	No. 10 gauge.	No. 9 gauge.
1in.	4d.	5d.	6d.	8d.	9d.	—
1½in. ..	3½d.	4½d.	5d.	6½d.	7d.	—
2in.	3d.	4d.	4½d.	5½d.	6d.	8d.
2½in. ..	2½d.	3d.	3½d.	4½d.	5d.	7d.
3in.	2d.	2½d.	3d.	3½d.	4d.	6d.
4in.	—	2d.	2½d.	3d.	3½d.	5d.
6in.	—	1d.	2d.	2½d.	3d.	4½d.

BRASS WIRE LATTICE.

Per foot super.

Size of Mesh.	No. 15 gauge.	No. 14 gauge.	No. 13 gauge.	No. 12 gauge.	No. 11 gauge.	No. 10 gauge.
1in.	1/7	1/8	1/10	2/–	2/3	2/6
1½in. ..	1/4	1/5	1/6	1/8	1/10	2/–
1⅝in. ..	1/3	1/4	1/5	1/6	1/8	1/10
2in.	—	1/1	1/2	1/3	1/5	1/8
2½in. ..	—	—	11d.	1/–	1/3	1/6

RIBBON WORK.

Mesh.	Strand.	s.	d.
1in.	x 3/16in. double strand, per square foot	1	9
1¼in.	x ¼in. ,, ,, ,, ,, ,, ...	1	6
1in.	x ⅛in., single strand, per square foot	1	6
1in.	x ¼in. ,, ,, ,, ,, ,, ...	1	9
1¼in.	x ¼in. ,, ,, ,, ,, ,, ...	1	3

See advt., page 21.

WOVEN WIRE (Galvanised).

Wide.	Meshes to inch.	Gauge Wire.	per yard. s. d.
24 and 36	16	28	1 0 and 2 0
24 „ 36	12	24	1 4 „ 1 8
24 „ 36	10	26	1 0 „ 1 8
24	4 to 8	20 to 24 — ..	1 0
36	4 and 6	20 and 22	1 4 1 6

BRASS WOVEN WIRE.

Wide.	Meshes to inch.	Gauge of Wire.	Per yard. s. d.
36 (fine)	20, 24, 40	28 to 34 ..	5 0
36	30 and 36	32	3 9 and 4 3
36 (coarse)	12 „ 16	30	2 0 and 3 6
24 to 36	12	24	4 6 to 6 6

CHAIN WIRE NETTING (Galvanised).

For Fencing, &c.

Mesh.	Gauge.	Per sq. ft.	Mesh.	Gauge.	Per sq. ft.
3in.	8	3½d.	1⅝in.	12	3d.
2in.	8	4d.	1⅝in.	14	2½d.
2in.	10	3¼d.			

LOOSE LINK NETTING.

For Encasing Iron Girders.
Fencing, all gauges, per square yard, 1/6.
See agents' advt., page 11.

GALVANISED WIRE NETTING.

Rolls 50 yards each. Prices liable to fluctuation.

Mesh.	Gauge.	2ft.	3ft.	4ft.	per sup. ft.
½in.	20	25/–	37/6	50/–	4d.
¾in.	20	12/6	18/9	25/–	2⅛d.
1in.	19	11/3	16/–	22/–	1⅞d.
1½in.	18	9/–	13/6	18/–	1½d.
2in.	18	7/–	10/6	14/–	1¼d.

WEIGHT OF FENCING WIRE.

(Ironmonger's List.)

Gauge Number.	Weight Per Mile.	Yards Per Cwt.	Break'g Strain.	Weight o Fence Per Mile for 2 Wires.	3 Wires.	4 Wires.	5 Wires.
	lbs.	yards	lbs.	c. q. lbs.	c. q. lbs.	c. q. lbs.	c. q. lbs.
4	714	276	2197	12 3 0	19 0 14	25 2 0	31 3 14
6	495	397	1528	8 3 10	13 1 1	17 2 20	22 0 11
8	344	573	1060	6 0 16	9 0 24	12 1 4	15 1 12
10	241	819	741	4 1 6	6 1 23	8 2 12	10 3 1
12	142	1393	436	2 2 4	3 3 6	5 0 8	6 1 10

SPACING TABLE.

Distance apart	9ft.	10ft.	12ft.	14ft.	16ft.	18ft.	20ft.	22ft.	27ft.	36ft.	45ft.
	NUMBER OF POSTS PER MILE.										
Posts	587	528	440	378	330	293	264	240	196	147	118

Example of how to Estimate Cost of Fencing.

Approximate costs per mile of girder steel fencing, consisting of five plain wires and one barb, with standards 21ft. apart, and two droppers between each standard. Height of fence, 3ft. 9in.

Appx. weight. Cwt.	q.	lbs.		Melbourne. £	s.	d.
15	0	0	240 Steel Girder Posts, 5'6" long, 125/– per 100	15	0	0
3	0	0	10 do. Straining Posts, with sole pieces, 6/– each	3	0	0
0	2	0	4 do. do. Stays, with ground plates, 5/–	1	0	0
6	2	0	480 do. do. Droppers, 30/–	7	4	0
16	0	0	16 Cwt No. 8 Black Wire, 8/6	6	16	0
4	0	0	4 Cwt No. 12 Barb Wire, 13/–	2	12	0
			Labour, erecting, 1/– per chain	4	0	0
45 cwt.				39	12	0
			Carriage to be added at say 20/– per ton ..	2	5	0
				£41	17	0

For wooden or other posts, if used, leave out the first three items, and add cost.

WIRE NETTING AND FENCES.

When erecting a new wire fence arrange for one of the wires to be 36in. from the ground, and bore the hole for wire 1in. from the side of the posts, thus prepare for 42in. netting, as it will stretch easily and neatly along the fence without bulg ng round each post.

Footing Netting, for repairing old fences, 12 x 1¼ x 17 g., dipped in tar, repairs an old fence and costs about one-third of the price of new netting.

To prevent netting from corroding dip the roll 6in. or 7in. in 2 parts of coal tar and 1 part kerosene, heated nearly to boiling point, and let dry before us ng. Block and tackle very handy.

N.B.—Wire netting is carried at about half rates in returning empty cattle trucks if it suits the convenience of the Railway Department, or at M rates, providing the consignment weighs 6 tons or over.

ELECTRIC TELEGRAPHS.

Labour, per Mile.	£	s.	d.
Erecting iron poles and one wire (labour only), near Sydney or Melbourne	5	10	0
Fixing extra wire on ditto	1	10	0
Ditto, stays and struts, extra, each	0	7	6

Wooden telegraph poles will cost about the same as the timber for rough timber bridges, with the cartage added.

For Turned Telegraph Poles, *see* page 57.

"CYCLONE" FENCES.

Frames and Scrollwork Panels (unpainted)—

	24in.	30in.	36in.
Wide			
Per running foot, from	3/6	4/3	5/–

1⅛in. Tubular Framed Gates, with Scrollwork—Single Gates, 3ft. x 4ft., from 30/–; Double Gates, 9ft. x 4ft., from 80/–.

6ft. Tubular Steel Posts, 2¼in. dia., with broad foot-base attached, 9/– each. Rounded top.

"Cyclone" Fences, wirework, without posts or rails. Style "A," **Plain** rectangular mesh about 6 longitudinal wires—

Height.	24in.	30in.	36in.	42in.	46in.	48in.	52in.	58in.	64in
3in. mesh wide ..	6d.	7d.	8d.	9d.	10d.	1/–	1/1	1/3	1/4
2½in. ,, ,, ..	7d.	8d.	9d.	10d.	11d.	1/2	1/3	1 5/	1/6
1¾in. ,, ,, ..	9d.	10d	11d.	1/–	1/1	1/4	1/6	1/8	1/9

Gates, Style "A" (complete with fitting)—

	3ft.	3½ft.	4ft.	8ft.	9ft.	10ft.
Prices ..	16/6	18/9	19/6	29/–	32/–	35/–

Style "F," Ornamental—

Height ..	36in.	42in.	46in.	48in.	52in.	58in.
Prices, ft. run	1/–	1/4	1/5	1/6	1/9	2/–

Gates to Match "F" (complete with fittings)—

Width ..	3ft.	3½ft.	4ft.	8ft.	9ft.	10ft.
Prices ..	16/6	18/9	19/6	29/–	32/–	35/–

These prices are for gates up to and including 4ft. in height, other sizes increase proportionately.

CYCLONE DROPPERS.

No. 6 Gauge.			No. 4 Gauge.		
Length of Pickets. in.	Weight per 100. lbs.	Price per 100.	Length of Pickets. in..	Weight per 100. lbs.	Price per 100.
30	26	6/3	30	36	9/3
36	31	7/5	36	43	11/3
42	36	8/8	42	50	13/–
48	41	10/–	48	57	14/9
54	46	11/–	54	64	16/6

Droppers are made up in bundles of 50.

"Cyclone" Loops, gal., for securing Pickets to wire (200 in 1lb.), 6d. per lb.

Galvanised Staples, 1½in. (weight per 1000, 16lbs.), 2½d. per lb.

Twisting Pincers, for fastening Loops, 1/6 per pair.

Patent Combination Plyers, Wire Cutters and Staple Puller, 4/– per pair.

SPRING COIL WIRE FENCE. (In 5 Chain Rolls.)

Height.	No. of Lines.	Per Roll.	Weight. lbs.	Height.	No. of Lines.	Per Roll.	Weight. lbs.
30in.	8	32/6	143	36in.	6	27/6	113
36in.	9	37/6	164	40in.	7	30/–	128
42in.	10	40/–	188	44in.	7	32/6	133
48in.	11	42/6	196	48in.	8	35/–	152
58in.	12	47/6	216		9	37/6	170

(*See* advt., page 44.)

FENCING AND GATES.

"Pittsburg" Electrically Welded Wire Mesh Fence.

In rolls 11 yards long.

Height In.	No. of Horizontal Wires	Width between Upright Wires. in.	Weight per rod. lbs.	ozs.	Per rod. s.	d.	Per yard. s.	d.
36	10	6	8	0	3	7	0	7
42	11	6	9	0	4	0	0	8
48	12	6	10	0	4	5	0	9
36	10	12	6	9	2	9	0	5
42	11	12	7	5	3	0	0	7
48	12	12	8	2	3	4	0	8
58	19	6	11	4	4	6	0	10

Top and bottom wires, No. 10 gauge; other wires, No. 12 gauge.
58in. top and bottom wires, No. 11; other wires, No. 14 gauge.

Lawn Fence Wire—48in. and 36in., 4in. x 2in., 1/6 and 2/– per yard.
See agent's advt., page 14.

"Kitselman's" Duplex Woven Wire Fence Machine—

Machines for weaving cross wires together, from 1in. to 6in wide meshes on the site. A woven fence, 6 wires, posts, 22ft. apart, is said to cost 14/– per chain.

WIRE STRAINERS.

Wire King Strainer, each	16/–	Federal Strainer, per doz.	3/–
Pat. Telegraph, each ..	12/–	Lever for Federal, each ..	3/–
Titan, each	15/–	Walker's, per doz. ..	4/–
Donald's Multigrip, each	17/–	Ewen's, per doz.	4/–
Page's, each	21/–	Levers for Ewen's ..	5/–

The Anchor Clamp Wire Fence.

Mesh. in.	No. Horizontal Rods.	Weight per 100ft.	Height. in.	Cost per ft. run.
3 x 12 or	3	118lbs.	30	1/1
3 x 15	3	134lbs.	36	1/2
6 x 6	6	109lbs.	36	9½d.
Top 6 x 6	5	118lbs.	30	1/2
bottom	6	150lbs.	36	1/5
3 x 6	7	167lbs.	42	1/8
2 x 6	5	206lbs.	30	1/11

Anchor Clamps (black), 12/–; Gal., 14/6 per 1000 = 17lbs.
Automatic Ratchets, 6/–; Gal., 8/– per doz. = 13 lbs.
Anchor Clamp Pinchers, 20/– each = 7lbs.

Barb Wire—

1 reel weighs 1 cwt. net.
12 gauge thickset, 450 yards to cwt, or 4 cwt. per mile.
14 gauge thickset, 700 yards to cwt., or 2½ cwt. per mile.

Steel Barbed Wire, 3in. spaced—

Gauge. No.	Weight per Mile. c.	q.	lbs.	Yards. per cwt.	Price per Ton. £	s.	d.	Price per Mile. £	s.	d.
14	2	0	19	810	20	10	from	2	4	6
12	2	3	15	610	19	0	0			

PATENT GATES, etc.

DRIVEWAY GATE.

Suitable for Entrances or Public Roads.

Pat. Driveway Automatic Opening and Closing Gates—

10ft. Gate, tubular, 1½in. framing, 7/16 intermediate bars and braces, including all attachments for opening out of a vehicle, from £4 to 5 10 0

10ft. Gate, 1½in. framing, ⅜ intermediate bars and braces, including all attachments for opening out of a vehicle 5 0 0

These attachments can be fixed to any gate already erected.

The " Otto " Patent Gate Opener—

Tubular Gate, 10 x 4ft., all gear complete, £4 to .. 6 0 0

The McNeill-Carter Pat. Automatic Gate Manipulator—

Fittings can be applied to any gate of " Cyclone " pattern and manufacture, fittings, complete 2 5 0

N. Z. Automatic Closing Gates—

By passing of wheel over raised iron lever the gate swings away, and closes when other lever is released by wheel passing over corresponding lever at the other side of gate (Buzacott & Co.). Prices, fittings, from 3 0 0

See advt., page 44.

Kingloc 1⅜in. Tubular Iron Framed Self-closing Gravity Gates—

Wire netting on wires—3ft. wide, 28/–; 8ft. x 4ft., 36/–; 12ft. x 4ft. high, 40/–.

See advt., page.

" Otto " 1⅜in. Tubular Gate, with Top Scroll, Woven Wire—

7 x 4 mesh, 12ft. wide x 4ft., 36/–.

Woven wire, plain close mesh, rabbit proof, 12ft., 40/–.

Anchor Fence 1⅜in. Tubular Braced Paddock Gates—

10ft. x 4ft., 23/–; netted, 28/–.

SINGLE AND DOUBLE.

IRON TUBE FRAMED RESIDENCE GATES.

" Cyclone " Ornamental Patterns.

Price, including all Hangings and Fastenings.

3ft. Opening, £1/5/–; 3ft. 3in., £1/5/–; 4ft., £1/10/–.

3ft., with Fancy Netting and Scroll, £1/15/–.

9in. Single Opening, £1/10/ .

12ft. Double Opening, £2/5/–.

Built of Iron Tubing, 1in. outside diameter; filled with 6in. x 3in. wire mesh, secured with clips.

Height, 4ft.; weight, 9lbs. per lineal foot.

An 8ft. gate —72lbs.

ROLLED ORNAMENTAL STEEL FENCES AND GATES
(Hume's Patent.)

Manufactured in Adelaide.

Fences from 17in. to 48in., per foot run, fixed, 2/9 to 5/6.

Gate, 3ft. 3in., included in 30ft. run of same height of fence. Painted t ree coats, any colour.

Ornamental Gates, from 20/–; Posts, from 9/– pair; Brackets, from 5/–; Friezes and Crests, from 1/– per foot run.

For further particulars, *see* advt., page 45.

DROPPER WIRE FENCING.
Girder Steel Posts and Droppers.
(Pettits Pat., Geelong.)

A 6-wires Fence, 1 barbed, complete, cost about £42 per mile.

On wharf.	£	s.	d.
280 to the ton weight, 5ft. 6in. long, size 1½ x P, punched, for wires and slot at top for barb, per 100	6	10	0
224 to the ton, 5ft. 6in. long, ize 1½ x 1, punched for wires and slot at top for barb, per 100	7	15	0
Straining Posts, including sole pieces, each	0	6	0
Stays, with ground plates, each	0	5	0

FENCE DROPPERS (Various).

The standard gauge to which posts and droppers are punched is for 6 wires (reading from the ground upwards, including barb), 6, 5, 5, 6, 8, 12 — 42in. to top wire.

Steel Girder Dropper—	£	s.	
30in. long, punched for wires, and slot at top for barb ..	1	7	6
" **King-loc** " Dropper, 30in. — 134lbs. per 100 ..	1	6	0
Extra strong Dropper, 45in — 250lbs. per 100 ..	1	16	6
Page's Simple Dropper, 22in. =40lbs. per 100 ..	1	10	0
7-tongue do. do. 42in.= 75lbs. per 100 ..	0	16	8

Post Boring and Morticing Machines, with chisels and bits, £20. Post Boring Apparatus, 38/– to 50/–. Fencing Boxes, all iron, 6/– each. Wire Straighteners, 8/– to 25/– each. Earth Borers, for fencing posts, 3 sizes, viz.:—7in., 21/–; 9in., 25/–; and 12in., 40/–.

Posts erected and bored, 1/– each; Dropper, 3d. to 5d., at Labour at 1/– per hour.

Federation Droppers (in bundles of 50)—

Punched for 5 wires, 15/– per 100; 6 wires, 20/– per 100.

Auto-Screw Corrugated Steel Droppers, per 100 (at Sydney)—

15in., 17/6; 25in., 24/–; 34in., 30/–; 46in., 42/6.

5ft. Standards, 600 angle steel, 1½ x 1½ x ⅜ — 400 per ton; f.o.b. Brisbane, 95/– per ton.

Shipping freight—Brisbane to Sydney, 13/6; to Melbourne, 18/6; Adelaide, 23/6 per ton.

LEGAL NOTES.

RELATING TO BUILDERS AND CONTRACTORS AND ARCHITECTS.

TENDERS.

Tenders for Work or Goods.

A person who, by writing or by word of mouth, invites tenders for work to be done, or offers of or for goods for purchase or sale, does not by such invitation impliedly promise to accept any tender or offer, the invitation or notice to the effect that "tenders will be received," being no more than an announcement (unless it is expressly stated otherwise) that he is willing to receive tenders or offers (*Spencer* v. *Harding*, 5 L.R.C.P. 561).

But an unconditional tender to undertake work, or to supply goods, on specified terms, and the acceptance of such by the person to whom it is made, will be sufficient to constitute a binding contract; and an intimation in the acceptance of such tender, that a "contract will be prepared," merely means that a formal contract is to be drawn up (*Lewis* v. *Brass*, 3 L.R.Q.B.D. 667). If, however, the terms of the tender or acceptance imply that the proposed agreement is to be *subject* to the preparation and approval of a formal contract, there will be no binding agreement until the formal contract is completed (*Winn* v. *Bull*, 7 L.R. Ch. D. 29).

When Contracts should be in Writing.

A contract to build, alter, or repair a house, or any other construction, and to provide materials for the purpose, need not be in writing, unless it is *not to be performed within a year*; a contract to build, alter, or repair a house, etc., not being in law a contract for the sale of goods, even as regards the materials, but being an entire contract for work and materials.

But as regards building or other contracts which are not to be performed within a year—that is, contracts the complete performance of which will necessarily extend over more than a year, or the performance of which is intended by the parties to extend over more than a year—by the Statute of Frauds (29 Ch. II. c. 3, s. 4) "no action shall be brought . . . upon any agreement that is not to be performed within the space of one year from the making thereof, unless the agreement upon which such action shall be brought, or some memorandum or note thereof, shall be in writing and signed by the party to be charged therewith, or some other person thereunto by him lawfully authorised."

It is not necessary in every case that there should be a formal contract drawn up with technical precision or legal formalities. Any memorandum under the hand of the "party to be charged," which was made before action brought, and which names the contracting parties,

or so describes them as to identify them, and which contains, either expressly or by references to other written papers the terms of the agreement, will be sufficient to satisfy the Statute of Frauds, although it be merely a recognition or adoption of a prior written statement of such terms not signed by the party. But a memorandum expressing a *mere purpose* or *intention* is not sufficient to satisfy the Statute. Again, where a contract or note in writing exists which binds one party any *subsequent* note in writing, signed by the other, will be sufficient to bind him, provided it either contains in itself the terms of the contract, or refers to any writing which does contain them.

Building contracts entered into with a corporate body, to be binding upon the corporation, should be made under seal (*Hunt* v. *Wimbledon Local Board*, 4 L.R.C.P.D. 48; *Young* v. *Mayor of Leamington*, 8 L.R.Q.B.D. 579). But trading corporations can contract without seal for matters essential to the purpose for which they are formed (*South of Ireland Colliery Company* v. *Waddle*, 38 L.J.C.P. 338).

Contracts for Sale of Goods.

By the Statute of Frauds, a contract for the sale of any goods *of the value of* £10 *or upwards* shall not be enforceable by action unless (i.) the buyer shall accept part of the goods so sold, and actually receive the same; or (ii.) give something in earnest to bind the contract, or in part payment; or (iii.) unless some note or memorandum in writing of the contract be made and signed by the party to be charged or his agent in that behalf; and these provisions are to apply to every such contract, notwithstanding that the goods may be intended to be delivered at some future time, or may not at the time of such contract be ready for delivery.

There is an "acceptance" of goods within the meaning of the Act when the buyer does any act in relation to the goods which recognises a pre-existing contract of sale.)

Contracts with Building Committees.

Where a building contract is entered into with the trustees of a building fund, as of a church, chapel, or school, the contract may be so framed as to limit the liability of the trustees to the period during which they remain trustees, as well as to exempt such trustees from all personal liability, binding them only to the extent of the building fund (*Williams* v. *Hathaway*, 6 L.R.C.D. 544).

Death of Employer before Building Contract completed.

It is a presumption of law that the parties to a contract bind not only themselves, but their personal representatives, except in the case of contracts involving the exercise of individual skill personal, such as a contract to paint a picture. And so, in the case of a building contract, where the employer dies before the contract is completed, his executors or administrators are bound not only to pay such

sums as may be due for work already done under contract, but to carry out the deceased employer's obligations so far as they remain unfulfilled under the contract; and, on the other hand, the executors or administrators of such deceased employer will be in a position to bring an action against the builder if he fail to carry out his part of the contract (*Wentworth* v. *Cook*, 10 Adolphus & Ellis 42; *Cooper* v. *Jarman*, 3 L.R. Eq. 98).

Contracts of Hiring.

It is sometimes advisable that contracts of hiring and service should be in writing, in view of the provision made by s. 4 of the Statute of Frauds as to "agreements not to be performed within the space of one year from the making thereof."

It should also be remembered that where no time is limited, either expressly *or by implication*, for the duration of a contract of hiring and service, the hiring is considered, in law, a hiring for a year. And this rule applies to all contracts of hiring and service, whether written or verbal, whether express or implied, and whatever the nature of the service (*R.* v. *Worfield*, 5 T.R. 506; *Emmens* v. *Elderton*, 13 C.B. 495). But it does not apply where the contract contains stipulations inconsistent with the application of it (*Baxter* v. *Nurse*, 6 M. &. G 935). Nor does the rule apply where there has been a service, but no contract of hiring, and no circumstances from which a contract can be implied (*Beeston* v. *Collyer*, 4 Bing. 313).

If the agreement is to do work by the job, it cannot be considered a yearly hiring, although the job last more than a year (*R.* v. *Woodhurst*, B. & Ad. 325). But if the hiring be for a year, a mere stipulation for payment by piece-work will not render it the less a yearly hiring (*King's Norton* v. *Cambden*, 2 Str. 1139). In a case where the hiring was at 3s. per week "all the year round," with liberty to leave on a fortnight's notice, this was held to be a yearly hiring (*R.* v. *Birdbrooker* 4 T.R. 245).

Where the *only circumstance* from which the intended duration of a contract of hiring and service can be inferred is the *reservation of wages weekly* it must be taken to be a weekly hiring. But if there be anything in the contract of hiring to show that it was intended to be for a year, the reservation of weekly wages will not control it.

All contracts of hiring and service are put an end to by the death of the master, and therefore the executors or administrators of the master cannot bring an action to enforce a contract of service after his death.

An indenture of apprenticeship is dissolved by the death of either master or apprentice (*R.* v. *Peck*, 1 Salk. 68). But where the apprentice is bound to two masters, on the death of one he becomes the apprentice of the survivor (*R.* v. *St. Martin*, 1 Harr. & W. 69).

Building and Leasing Agreements.

Where an owner of land agrees with a builder that, upon the erection of houses upon such lands in conformity with the terms and conditions of the agreement, the owner will grant to the builder leases of separate plots of such land, such an agreement is a separable contract ; and the builder (or assignee of such agreement) will be entitled to have leases of particular plots granted to him upon his performance of the agreement so far as those plots are concerned, although he may be unable to carry out the agreement in its entirety (*Williamson* v. *Clements*, 8 L.R. Ch. 96).

It has been held by the Court of Appeal that a building containing several residential flats constitutes only one house within the meaning of the word "house" in a covenant not to erect more than a certain number of houses, unless there is some context which cuts down or alters the popular interpretation of the word (*Kimber* v. *Admans*, C.A [1900] 1 Ch. 412).

Architect's Certificates.

Where an architect's certificate that work has been done in a satisfactory manner is a condition precedent to payment under a building contract, a letter from the architect inclosing the builder's account, or a mere checking of the account by the architect, is not sufficient ; but the architect's certificate must be in terms showing that the work has actually been done (*Morgan* v. *Binnie*, 9 Bingham 672).

But when an architect has fraudulently and in collusion with the employer, withheld a certificate that the builder has satisfactorily executed the work he had undertaken, the builder, if the contract was made with him by the architect as the agent for the employer, can sue the architect for damages (*Ladbrook* v. *Barrett*, 46 L.J.C.P.D. 798 ; and see *Milner* v. *Nield*, 5 Ex. 829). And where the contract is made direct with the employer, and not through the architect, the builder under similar circumstances may proceed against the architect (*Stevenson* v. *Watson*, 48 L.J.C.P. 318).

Where an architect has acted "improperly and unfairly in the exercise of the powers conferred on him by the contract," so that the builder is a loser through his misconduct, the builder will be entitled to recover from the employer the full amount to which he is entitled under the contract (*Pawley* v. *Turnbull*, 3 Gifford 70).

But an action will not lie against an architect for carelessly and negligently performing the work required to give a certificate, unless fraud be also established, the duties of the architect in relation to granting a certificate being not ministerial but judicial (*Stevenson* v. *Watson*, 48 L.J.C.P. 318).

Where a building contract provided that the decision of the archi-

tect as to the execution of works should be final and without appeal, and the building-owner refused to pay a portion of the architect's fees, on the ground of alleged negligence by the architect in not deducting from the builder's account a sufficient amount for work not actually done, it was held by the Court of Appeal that, although the architect's certificate was final as between the building-owner and the builder, the building-owner was not bound by it as between himself and the architect (In re *Rogers*, architect · see *Architect*, Nov. 20, 1891.)

Charges of Quantity Surveyor.

It was decided in 1892 that the "reasonable usage" of the building trade is that the builder whose tender is accepted is liable to the quantity surveyor for the amount due for taking quantities; but if no tender be accepted, the building owner or architect is liable *North* v. *Bassett*, 1 Q.B. 333).

Extras.

Where a claim is made for extras, it must be shown from the original contract what was intended to be included therein, so that what will constitute extras may be ascertained (*Buxton* v. *Cornish*, 12 M. & W., 426).

In a case where a builder had contributed to build and complete a house according to a specification, and the specification, while mentioning the scantling of joists for the floors, rafters, and ridge and wall plates, made no mention of the flooring, it was held that the builder could not charge the flooring as an extra; the agreement and specification, taken together, making it clear that the builder could not have reasonably supposed the flooring would be an extra (*Williams* v. *Fitzmaurice*, 3 H. & N., 844).

Where it is stipulated in a building contract, that additions made under "an order in writing" shall be paid for, the builder cannot claim payment for extras which may be done without such order, even though done at the verbal request of the employer (*Russell* v. *Bandeira*, 13 C.B.N.S. 149; *Westwood* v. *Secretary of State for India*, 7 L.T.N.S. 736; *Franklin* v. *Parke*, 6 L.T.N.S. 291). And even though payments in advance have been made on the architect's certificates after variations have been made, these will not obviate the necessity of showing that "orders in writing" directing the variations were given as required by the contract, to enable the builder to make a valid claim for payment for such variations (*Tharsis Sulphur and Copper Company* v. *McElroy*, 3 L.R. App. Cas. 1040).

Mere sketches of extra work, drawn by the architect, and by him handed to the builder, are not in themselves a sufficient compliance with a requirement that extras are to be done under an order "in writing" (*Myers* v. *Sarl*, 30 L.J.Q.B. 9).

But where it was stipulated in a building contract that no extras should be allowed without a written order, and that in case of dispute the architect's decision was to be final, and the architect at the end of the contract made a certificate allowing extra work for which no written order had been given; it was held that neither employer nor builder could raise the question whether a sufficient order had been given, unless the conduct of the architect in making the certificate had been fraudulent (*Goodyear* v. *Mayor of Weymouth*, 35 L.J.C.P. 12).

Rights to Light and Air.

By the Prescription Act, a right to the use of light for a dwelling house, workshop, or other building is obtained by the enjoyment of it for twenty years without interruption, unless the right was enjoyed only by consent or agreement in writing (2 & 3 Will. IV. c. 71, s. 3).

But it has recently been determined (1904) by the House of Lords (i) that an owner of ancient lights, in case of interference therewith by new buildings, is not as a matter of common law entitled to the same amount of light as his premises enjoyed before the interference; and (ii) that the Prescription Act has not the effect (which has sometimes been attributed to it) of giving him an absolute right to the full amount of light enjoyed for twenty years. He is only entitled (it was decided) to such an amount of light as is necessary according to ordinary notions for the beneficial use of his property; and any obstruction of his light, to justify the grant of an injunction, must be of such a degree as to constitute a nuisance (*Colls* v. *Home and Colonial Stores* (reversing judgment of Court of Appeal), H. L. (E.) [1904] A.C. 179; L.R. [1902] 1 Ch. 302).

Although the owner of ancient lights may improve his light, he must not increase if (*Jones* v. *Tapling*, 31 L.J.C.P. 342); and if an attempt is made by the owner of a tenement to enlarge his lights, or to add new ones, the adjacent owner may obstruct them until they are reduced to the original form and number (*Garritt* v. *Sharp*, 3 A. & E. 325).

Ancient lights cannot, however, be obstructed merely because the owner has opened new ones; but only where, in obstructing the new lights, the owner of the adjacent property unavoidably obstructs the ancient ones also (*Binckes* v. *Pash*, 31 L.J.C.P. 121).

Where the light of a dwelling house or other building has been unlawfully obstructed for six years or more, without steps being taken to oppose it, the Courts will be reluctant to interfere (*Gaunt* v. *Fymney*, 42 L.J. Ch. 122).

When a building having rights to ancient lights is pulled down, the rights to light are not thereby extinguished; and upon being satisfied that the owner intends to re-erect the building, the Court will grant an injunction to restrain an erection of premises interfering with such rights to light (*Ecclesiastical Commissioners* v. *Kino*, 49 L.J. Ch. Ap. 529).

Ancient lights may be abandoned in the re-erection of a building by deviating from the original line of frontage, so that a new term of twenty years will have to run to establish an easement ; but the *mere setting back* of ancient lights in parallel lines is not abandonment (*National and Provincial Plate Glass Insurance Co.* v. *Prudential Insurance Co.*, L.R. Ch. D. 757 ; 46 L.J. 871).

Rights to air are not recognised to the same extent as rights to light, and no prescriptive right to air can be acquired under the Prescription Act (*Potts* v. *Smith*, 38 L.J. Ch. 58). The right to an access of air as well as light by a window may be acquired by prescription, but the right to enjoy an open prospect cannot be acquired except by agreement (*Dalton* v. *Angus*, 6 App. Cas. 740 ; 50 L.J.Q.B. 748). There can be no prescription for a free passage of air to a windmill over the open land of another owner (*Webb* v. *Bird*, 31 L.J.C.P. 335). Accordingly, in a recent case it was laid down by the Court of Appeal that, although a right to have air come over a neighbour's land in a particular channel to a particular place may be established by immemorial user, yet, in the absence of actual contract, no one can claim a right to have the general current of air over his neighbour's property kept uninterrupted (*Chastey* v. *Ackland*, C.A. [1895] 2 Ch. 389). Thus, an interference with the direction of a current of air has been held not to be actionable, although productive of grave inconvenience and even injury, as in a case where the defendants had raised the height of their house, with the result that the plaintiff's chimneys "smoked" (*Bryant* v. *Lefever*).

FIXTURES.

"Tenant's fixtures" are personal chattels annexed to the freehold by the tenant during his occupancy, either for mere ornament and convenience or for the purpose of his trade, and which he has a right to sever during such occupancy in the absence of any express stipulation or local custom to the contrary.

"Landlord's fixtures" are those put up by the landlord before or during the term of the tenant's occupancy, or by any previous owner or tenant or by any other person ; also such fixtures put up by the tenant during the term as the tenant has no right to remove. All these constitute part of the freehold, and also part of the premises demised. In a more confined sense, "landlord's fixtures" are the fixtures which are on the premises at the time of letting to the tenant and are demised therewith, and which are usually specified in a schedule to the lease or agreement ; and to these may be added erections and fixtures subsequently added by the tenant, which he is not entitled to remove during his occupancy.

Amongst articles put up for ornament or for convenience of a tenant which have been held to be removable as *tenant's fixtures*, are :

hangings, tapestry, and pier-glasses, whether nailed to the walls or panels or put up in lieu of panels; cornices; marble and other ornamental chimney-pieces; marble slabs; window-blinds; wainscot when *screwed* to the walls; grates, stoves, and ranges, although fixed in brickwork; iron backs to chimneys; beds fastened to the walls or ceilings; fixed tables; furnaces and coppers; pumps; mash-tubs; fixed water-tubs; coffee and malt mills; cupboards fixed with holdfasts; bookcases standing on brackets and screwed to the walls, clock-cases; iron ovens. But such fixtures can only be removed if the removal can be effected without material damage to the freehold.

A wider rule prevails at law with respect to trade fixtures than to fixtures for mere ornament or convenience of an occupier. Thus, a nurseryman is allowed to remove his greenhouses, but a private individual is not (*Wyndham* v. *Way*, 4 Taunton, 316). But greenhouses built in a garden, and constructed of wooden frames fixed with mortar to foundation walls of brickwork, cannot be removed by the occupier who built them; nor may a boiler built into the masonry of the greenhouse be removed by the tenant; but the pipes of a heating apparatus which is connected with the boiler by screws may be removed by him. (*Jenkins* v. *Gething*, 2 Hemming and Johnson, 520).

Among appliances which have been held to be *trade fixtures removable by a tenant* (in the absence of express stipulations to the contrary in the lease) are: furnaces, vats, coppers; dyeing and brewing vessels, and pipes belonging thereto; steam-engines, and chimneys belonging thereto; baking-ovens; cider-mills; salt-pans. Machinery, engines, plant, and utensils used in trade, however bulky or complex, may be taken to pieces and removed; also a temporary shed erected for the purpose of protecting a steam-engine or machinery, or for other temporary purpose; but if the building stand on stone or brick foundations let into the soil, and is so constructed as not to be removable without the entire destruction of the fabric, it cannot be disannexed from the freehold and taken away.

A tenant should always remove his fixtures prior to the determination of his tenancy, for after he has quitted the premises he cannot re-enter for the purpose of severing and removing his fixtures without express permission (*Lyde* v. *Russell*, 1 B. & A. 394; *Minshall* v. *Lloyd*, 2 M. & W. 450).

And in whatever mode a lease or other tenancy be determined, the tenant has no right (unless protected by special contract) to remove his fixtures after he has ceased to be in lawful possession. Thus, where a tenant had forfeited his lease by an act of bankruptcy, and the landlord re-entered, it was held that the landlord was absolutely entitled to all fixtures remaining upon the premises at the date of the re-entry (*Pugh* v. *Arton*, 38 L.J. Ch. 619).

EMPLOYERS' LIABILITY ACT, 1897.

Where personal injury is caused to a workman—

(1) By reason of any defect in the condition or the ways, works, machinery, or plant connected with or used in the business of the employer ; or

(2) By reason of the negligence of any person in the service of the employer who has any superintendence entrusted to him whilst in the exercise of such superintendence ; or

(3) By reason of the negligence of any person in the service of the employer to whose orders or direction the workman at the time of the injury resulted from his having so conformed ; or

(4) By reason of the act or omission of any person in the service of the employer done or made in obedience to rules or by-laws of the employer, or in obedience to particular instructions given by any person delegated with the authority of the employer in that behalf ; or

(5) By reason of the negligence of any person in the service of the employer who has the charge or control of any signal, points, locomotive engine, or train upon a railway,

the workman, or in case the injury results in death, the legal personal representatives of the workman, and any persons entitled in case of death, shall have the same right of compensation and remedies against the employer as if the workman had not been a workman of nor in the service of the employer, nor engaged in his work (s. 4).

A workman shall not be entitled under this Act to any right of compensation or remedy against the employer in any of the following cases :—

(1) Under sub-section 1 of section 4 unless the defect therein mentioned arose from, or had not been discovered or remedied owing to the negligence of the employer, or of some person in the service of the employer, and entrusted by him with the duty of seeing that the ways, works, machinery, or plant were in proper condition.

(2) Under sub-section 4 of section 4, unless the injury resulted from some impropriety or defect in the rules, by-laws or instructions therein mentioned.

(3) Under sub-section 6 of section 4, unless the defect arose from or had not been discovered or remedied owing to the negligence of the employer or of some person in the service of the employer and entrusted by him with the duty of seeing that the gearing, &c., were in proper condition.

(4) In any case where the workman knew of the defect or negligence which caused his injury, and failed within a reasonable time to give, or cause to be given, information thereof to the employer, unless he was aware that the employer or such superior already knew of the said defect or negligence.

Amount Recoverable for Compensation.

The amount of compensation recoverable under this Act shall not exceed such sum as may be found to be equivalent to the estimated earnings, during the three year preceding the injury, of a person in the same grade employed during those years in the like employment and in the district in which the workman is employed at the time of the injury (s. 10).

Time within which Compensation may be Claimed.

An action for the recovery under this Act of compensation for an injury shall not be maintainable unless notice that injury has been sustained is given within six weeks, and the action is commenced within six months from the occurrence causing the injury, or, in case of death within twelve months from the time of death: Provided always, that in case of death the want of such notice shall be no bar to the maintenance of such action if the judge shall be of opinion that there was reasonable excuse for such want of notice (s. 6).

Where Money Payable under Penalty.

There shall be deducted from any compensation awarded to any workman, or representatives of a workman, or persons claiming by, under, or through a workman in respect of any cause of action arising under this Act, any penalty or part of a penalty which may have been paid in pursuance of any other Act of Parliament to such workman, representatives, or persons in respect of the same cause of action arising; and where an action has been brought under this Act by any workman, or the representatives of any workman, or any persons claiming by, under, or through such workman for compensation in respect of any cause of action arising under this Act, and payment has not previously been made of any penalty or part of a penalty under any other Act of Parliament in respect of the same cause of action, such workman, representatives, or person shall not be entitled thereafter to receive any penalty or part of a penalty under any other Act of Parliament in respect of these same cause of action (s. 11).

Service of Notice of Injury.

Notice in respect of an injury under this Act shall give the name and address of the person injured and shall state in ordinary language the cause of the injury and the date at which it was sustained, and shall be served on the employer, or if more than one employer, upon one of such employers.

The notice may be served by delivering the same to or at the resi dence or place of business of the person on whom it is to be served, or by post by a registered letter addressed to such person at his last known place of residence or place of business, and if served by post shall be deemed to have been served at the time when a letter containing the same would be delivered in the ordinary course of post ; and, in proving the service of such notice, it shall be sufficient to prove that the notice was properly addressed and registered.

Where the employer is a body of persons corporate or incorporate, the notice shall be served by delivering the same at, or by sending it by post in a registered letter addressed to the office, or, if there be more than one office, any one of the offices of such body.

A notice under this section shall not be deemed invalid by reason of any defect or inaccuracy therein, unless the judge who tries the action arising from the injury mentioned in the notice, shall be of opinion that the defendant in the action is prejudiced in his defence by such defect or inaccuracy, and that the defect or inaccuracy was for the purpose of misleading (s. 8).

Definitions.

For the purposes of this Act, unless the context otherwise requires—

The expression " person who has superintendence entrusted to him " means a person whose sole or principal duty is that of superintendence, and who is not ordinarily engaged in manual labour. The expression " employer " includes a body of persons corporate or incorporate. The expression " workman " means a railway servant, and anyperson to whom the " Employers' and Workman's Act, 1875," applies (s. 8).

Liability of Employer for Injury to Workman.

The law as to compensation for personal injuries received by a workman when engaged on work for an employer was amended by the Employers' Liability Act 1897. The Act will be found set out at pages following, and some important decisions bearing upon the interpretation of that Act are given below.

It was held by the House of Lords, with regard to risks of injury undertaken by a workman in the course of his employment (sect. 4 of the Act of 1897), that when a workman engaged in an employment not in itself dangerous is exposed to danger from an operation in another department over which he has no control, which danger has been created or enhanced by the employer's negligence, the mere fact that the workman undertakes or continues in such employment with knowledge of the danger does not preclude him from recovering damages from an employer ; and the question whether he has so distinctly agreed to run the risk involved as to free the employer from responsibility, is a question of fact—that is, a matter to be decided by a jury—and not a question of law (*Smith* v. *Baker and Sons*, H.L. (1891 App. Cas. 325).

Under the rule of law, where injuries received by a workman were occasioned by the negligence of a fellow-workman, what was known as the doctrine of "common employment" was held by the courts to apply, so that the employer was not liable for such injuries. This doctrine was not abolished, but only modified (though to a large extent), by the Act of 1897. It was held by the House of Lords that, in an action to recover damages for injury caused by the negligence of a fellow-workman, the defence of "common employment" will not apply, unless both the injured workman and the workman whose negligence caused the injury were not only engaged in a common employment, but were working for the same employer. In the case in question, the injured workman was in the employment of a firm of builders, while the workman whose negligence caused the injury was employed by some iron-founders who were engaged upon the same job as the builders, though under a separate contract; and although the two workmen were at the time engaged in a common employment, the iron-founders were held responsible for the injury to the builder's workman (*Johnson* v. *Lindsay*, H.L. (1891) App. Cas. 371).

In a case decided in 1892, it was held that the words "defect in condition of works" (s. 4, sub-section 1), apply to "works" not on the premises of the employer; so that a builder was held liable for injury caused to a workman in his employ by the fall of a wall which his workmen were pulling down, and which he had neglected to have properly shored up (*Brannagan* v. *Robinson*, 1 QB. 344).

Payment of Smaller Sum "in settlement" of Debt.

It is well established (though commonly overlooked by business men) that *a mere cash payment* in lieu of a larger sum actually owing, though accepted in satisfaction by the creditor, does not in law discharge the debtor, there being in such case no "consideration" for the creditor's promise not to ask for the balance, and hence no contract enforceable at law (Co. Litt. 212 b; *Cumber* v. *Wane*, 1 Str. 426; *Foakes* v. *Beer*, H.L. 9 App. Cases 605).

But it is otherwise if the larger sum claimed be *in dispute*, and the smaller sum is accepted in consideration of the settlement of the dispute as to the amount of the debtor's liability, thus avoiding legal proceedings; or if the settlement (as commonly done with a body of creditors) is *by deed*, which of itself imports a consideration. And an offer by the creditor to "take a cheque" (or other negotiable instrument) for the smaller sum, in settlement of his claim, also imports a new consideration, the debtor's only obligation being to pay in cash; and such offer, if acted on by the debtor, operates to make a legal contract discharging the debt (*Solree* v. *Tripp* [1846] 15 M. & W. 23).

After six years any claim for the balance, if it has not been enforced by the creditor, will be barred by the Statute of Limitations. But the effect of the satute may be avoided by a subsequent acknowledgment of the debt.

Proffer of Cheque "in settlement."

When a cheque is sent by a debtor with an intimation that it is sent "in settlement" of a claim, it is a mistake to suppose that the creditor must return the cheque if he maintains that a larger amount is due to him. In two cases that went to the Court of Appeal, the defendant in each case had sent to the plaintiff a cheque for a smaller amount than was claimed, stating that it was intended to be "in settlement." The plaintiffs, however, both replied that they accepted the cheques "on account"; and in each case it was held that the plaintiff was not precluded from suing for the balance of his claim (*Miller* v. *Davies*, 59 L.J.R.Q.B. 293; *Day* v. *M'Lea*, L.R. 22 Q.B.D. 610, 612).

If, after a proper tender of an amount "in settlement," and the refusal by the creditor to accept such amount on account, the creditor should sue the debtor for the full amount claimed by him, he will (if successful) "recover" in the action only the amount on which he and the debtor have been at issue, and will be entitled to no more costs than are allowable on an action for the disputed amount (*James* v. *Vane*, 2 E. & E. 883; 29 L.J.Q.B. 169).

Payment of Wages—Truck Act.

By the Truck Act of 1900 it is required that wages of workmen be paid in money, it being made illegal by the Acts to pay wages in goods, or to make any agreement to set off as wages the price of articles supplied; or for the employer to impose any condition, express or implied, as to the person, time, or place with whom, or when, or where, a workman's wages or any portion thereof are to be expended. No deduction may be made from a workman's wages for sharpening or repairing tools, except by agreement not forming part of the conditions of hiring; and when part of a workman's wages is —by agreement, custom, or otherwise—payable in advance, the employer is expressly forbidden by the Act to make any deduction for interest or poundage.

A deduction from the wages of a workman for a subscription to a sick club is illegal under the Truck Acts, but in a case where a workwoman had acquiesced in the payment out of her wages of such a subscription, the Court of Appeal held (1892) that she was debarred from recovering back the amounts so paid the fund to which they were paid not being an unlawful one (*Hewlett* v. *Allen*, Weekly Notes, 139; see also Ex parte *Cooper*, 26 Ch. D. 693).

By the Liquor Act 1898 the payment of wages in any public-house is prohibited, except by the resident owner or occupier of a public-house, beershop, &c., to workmen *bona-fide* employed by him.

Any employer infringing the Truck Act renders himself liable for a first offence to a penalty not exceeding £10; for a second offence, not exceeding £25; and for a third offence the offender may be fined any sum not exceeding £50. Penalties are recoverable before two justices.

LIGHTING, HEATING, FIRE RESISTING.

LIGHTING.

For Country Residences

ACETYLENE GAS COMBINATION GAS GENERATOR AND PURIFIER PLANTS.

Exclusive of Pipes and Fittings for Lights.

The present price of Carbide is from 2d. per lb. or 20/– per cwt.

One pound is said to supply a light equal to 25 candle power for six hours' duration.

Capacity for 6 hours.	Plant— Stock.	Superior.	Cost per hour.	Consumption of Carbide per hour.
5 lights	£7 10 0	£12 15 0	1d.	½lb.
10 ,,	9 10 0	17 10 0	2d.	1lb.
15 ,,	12 10 0	22 0 0	3d.	1½lbs.
20 ,,	13 10 0	24 5 0	4d.	2lbs.
30 ,,	18 0 0	29 0 0	6d.	3lbs.
50 ,,	25 0 0	42 10 0	10d.	5lbs.

Further particulars—advt. pages 23 and 31.

Patent Chemical Purifiers, separately, 5 to 15 lights, each .. 2 0 0
Ditto, 1 to 30 lights, £3/–; and 50 to 100 lights, each 5 0 0
Self-contained Acetylene Gas Table Lamp .. 30/– to 2 10 0

ACETYLENE PIPE SERVICE.

Number of half-foot Burners or equivalent of other sizes, to burn at 2½in. or higher pressure at the burners.	Distance from Generating apparatus if a main pipe, or distance from main pipe if a branch.	Sizes of Pipes.
2	15ft.	⅛in.
5	30ft.	¼in.
10	40ft.	⅜in.
20	50ft.	½in.
50	100ft.	¾in.
70	130ft.	1in.
100	150ft.	1¼in.
150	180ft.	1½in.
270	250ft.	2in.

The cost of laying and jointing gas pipes, from 3d. to 6d.
See page 250.

AIR-GAS PLANTS.

For Lighting, Heating, Cooking.

The mixture called Air-Gas is said to contain 95 per cent. of air and 5 per cent. of petrol vapour ; it is also said to be non-explosive. It gives a brilliant white light when used with special small incandescent burners and mantles ; and a blue non-luminous flame, or vaporous heat, when used for stoves and heating.

Cost of burning 5 lights of 60 c.p. burners at 1d. per hour, or a 40 c.p. light burning 25 hours cost 3d.

The **motive** or driving power is by automatic regulated weights, which are wound up daily like a clock, the average unwinding of which is about 4ft. 6in. per hour, according to consumption more or less.

AIR-GAS PLANTS, Complete (Price f.o.b.).

Plants, 10 lights of 60 candle power, £26 ; 20 light, £40 ; 30 lights £50 ; 50 lights, £60 ; and 100 lights plant, £80 ; 200 lights plant, £153.,

Suitable for homesteads, churches, laundries, factories, &c. Several makes of Air-Gas plants are on the market, each claiming advantages.

" **Atmoslite** "—Agents Brandt & Co. *See* advt., page 23.
" **Premier** "—Agents, Elliott, McLean & Co. *See* advt., page 6.
" **Simpetrol** "—Agents, James Hardie & Co. *See* advt., page 12.
" **Ideal** " and " **Sunlight** "—8 lights, £23 ; 12 lights, £28 ; and many others.

KEROSENE LAMPS AND GAS-BURNERS.

Contractors' Kerosene, wickless flare lamps, for outside works—$\frac{3}{8}$in. tube, 8/6 ; $\frac{1}{2}$in. tube, 12/6.

Kerosene Incandescent Lamps, twencent burners, nickle, 13/– each.

Kerosene Oil Outside Lamp (" Sunlight ")—100 c.p., plain, stationary iron frame, £2/10/– ; raising or lowering, extra 13/–.

Inverted External Arc Lamps, with shade, for Air-Gas—1 light, 40/– ; 2 lights, 60/– ; 4 lights, 92/– ; ruby globes for doctor's, 7/6 extra.

Brandt's Window Reflecting Double Lamps, for shop fronts, Air-Gas, 30/– each.

Ditto do. single light pear-shaped globe, 18/– each.

Square Municipal Lamps, opal tops, 30/– each.

Billiard Table Pendants, only for Gas Burners—2 light, 45/–; 3 light, 7ft. 6in. arm, 60/– ; 4 lights, 80/–. Shades and Frames, 2/6 to 3/6 extra each

See advts., pages 2, 23, 29, 31, &c.

200 **c.p. Triple Inverted Mantle Pendant**, burns 3ft. of gas per hour, £3. Mantles, each 4d.

High Power Incandescent Gas Lamps, 1000 c.p. " Mammon "—consumption 18ft. gas per hour, £6/5/– ; mantles cost 2/6 each. 800 c.p. £5 ; 600 c.p., £4 ; mantles for latter, each 1/6.

For external use, except above 400 c.p., owing to heat generated.

Gas Radiator.

"**Phoenix**" **Kerosene Heating Stove,** red chimney, 31 inches high, £1/7/6.

Hannan's Kerosene Warming Stoves, portable, 20/– to £1/10/–.

"**Matador**" **Radiator,** 30in. high x 15in. dia., for Kerosene, with ruby wired chimney—25/–, 27/– to 34/– each.

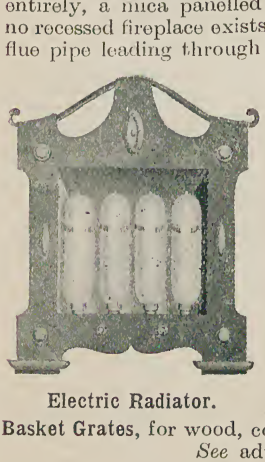
"**Ideal**" **Radiators,** for Gas (Danks), for low pressure, hot water, and steam; manufactured in different types, heights, and with hollow metal walls tested to a pressure of 100lbs. per square inch.

Radiators with coke fuel chamber attached.

Enamelled surface in different colours.

"**Esse**" **Coke** Slow Combustion Heating Stoves, Majolica enamelled in colours, £5 to £26. *See* advt., page 28.

In this patent heating stove the flues encircle the stove, and the full benefit of the heat is obtained and regulated by a patent regulator on the ashpan front, which controls the supply of air to the fire. Being of slow combustion, the refilling of fuel is necessary every 12 to 36 hours, according to size. The fire is raked by moving a bottom grate worked by a handle from the outside. The front of stove is closed entirely, a mica panelled fire door showing the glow of fire. Where no recessed fireplace exists it can be fixed flat against the wall with the flue pipe leading through only.



Electric Radiator.

Electric Radiator in grate, 40/– each. from 25/– each without grate.

Fletcher Russell "Whirpool" Circular Gas Heating Boiler, for hot water service independent of (or supplementary to) kitchen range, 22in. high x 10½in. dia., £8/5/.

Metters' Copper Cylinders, for hot water circulation—20 gals., £5/5/–; 25 gals., £5/12/6; 50 gals., £10.

Metters' Heating Stoves, for coal, 18/6 to 26/6.

Metters' Heating Stoves, Ornamental, for wood, 18in. long to 36in. long, 30/– to 90/–.

Basket Grates, for wood, coal or coke, from 7/– to 20/–.
See advts., pages 29, 31, 28, 51.

HEATING.

Register Grates, with fire brick, from 20/– upwards.
Ditto, with splayed tile sides, from 30/– upwards.
"**Bonny Vale**" **Grate,** Majolica enamel interior, £5/10/–.
Inserts Grates and varieties, obtain catalogues. *See* advts.

COOKING OVENS AND STOVES.

Colonial Ovens, 18in. x 12in. x 16in. deep, 12/6; 27in. x 14in. x 16in., 18/6; 30in. x 18in. x 18in., £1/5/–; 36in. x 18in. x 18in., £1/10/–.
The above with side traps in iron, extra 3/–.
Add for setting above, from 10/– each.
Fletcher Stoves, for coke or coal, single ovens, 30in., £5/5/–; 33in., £6/5/–; 36in., £7/10/–.
" Younger " Stoves, 48in. x 26in. x 20in., double ovens, &c., £12/7/6/–.
See advt., page 51.
Juleff's " Emu " Stoves, all sizes—33in. x 19in. x 24in., £6/6/–; Left and right hand, 26in. x 18in. x 24in., £4 to £5/5; Cottage Stove, 24in. x 16in. x 22in., £2/15/– to £4.
Metters' , Samson " Stoves, for wood, coal or coke, from £4/5/– to £6/5/–.
" Samson " Stoves and Ranges fitted with copper stove boiler, £10 to £24/10/–.
Metters' " Bega " Cottage Stoves, for 7 persons, £2/15/–; extended plate, 10/– extra.
See advt., page 29.
Ward's Stoves, from £2/15/– upwards.
Ward's Steam Cooking Ranges, from £12 upwards.
" Allington " Top Fire Stoves, for wood, £3/5/– to £5/–/–.
Slee and Ideal Cooking Stoves and Ranges, for Hotels.—4 ft. self setting double oven, 14 x 22 x 14, £11/5/–. *See* advt. page 52.

GAS COOKING STOVES.

" Kudos " High-class Gas Stoves, thin German steel plates, nickled parts, aluminium trays, and 6 top plate burners, £8.
" Kudos " Gas Ranges with ovens separate, £11 to £14.
For particulars, *see* advt., page 28.
" Raleigh " Paragon Gas Stoves, double oven, from £7/10/–.
Fletcher-Russell Gas Stoves (single-cased Garrick), £2/15/–.
Ditto, Oven, 24in. x 16in. x 13in., from £5/5/– to £7/10/–.
Ditto, 25in. x 19m. x 14in., for coal gas, £8/5/–; air gas, £9/10/–.
See advt., page 31.
Metters' Pat. Gas Stove, double ovens, from £4/15/– to £6/10/–.
Gas Grillers, small oven only, 20/– to 30/–.
Gas Rings, from 2/–; for washing coppers, 9/– to 35/–.
Brandt's " Hercules " Gas Cookers, for Air-Gas, from £7/12/– to £13/10/–.
Ditto, Grillers, for Air-Gas, from 18/– to 22/–.
Brandt's Table Standard Ventilating Fan, nickle, motive power Air-Gas system also Methylated Spirits, price £7 each.

LAUNDRY WASHING COPPERS,

With Seamless Copper and Circular Cast Iron Frames.

	£ s. d.		£ s. d.
10gal. copper ..	3 3 0	16gal. copper ..	4 5 0
12 ,, ,, ..	3 10 0	18 ,, ,, ..	5 0 0
14 ,, ,, ..	3 16 0	20 ,, ,, ..	5 15 0

Portable Coppers, wrought iron stands and frames, 10 gal., 32/–; 18 gal., 45/–.

"Caloric" Patent Fireless Cooking Stoves, with Heating Discs, 10in. x 1½in. thick, of natural soapstone, which are heated over a flame of gas, "Primus," or oil burner then placed in air-tight, wood-encased aluminium chamber with a safety steam valve.
Seamless aluminium utensils are placed inside this chamber, and food is either baked, roasted, steamed or boiled as required.
These stoves are suitable where no chimney exists, made in several sizes from one 8 quart in 15in. x 15in. x 15in. case, £3/10/–; three 8 quart in 15in. x 15in. x 41in. case, £8/5/–.

Cast Iron Incinerators, for burning rubbish and waste—size 29in. x 19½in. dia., 44/–; 33in. x 24in. dia., 60/–.
See maker's advt., page 29.

FIRE RESISTING

FIREPROOF DOORS.

The "Dreadnought" Door, a sliding door (panelled), about 2in. thick, fitted with automatic release clip, made to suit special conditions. Prices and particulars varying accordingly.
See agent's advt., page 6.

ARMOURED SLIDING DOORS.

Fitted with Patent Self-closing Apparatus.

These are made of three or four thicknesses of timber (according to size of opening), and are completely covered with Tinned Steel Sheets, put on in such a manner that, whilst free to expand, they exclude the air and cannot become detached.

By excluding the atmosphere from the wood combustion is prevented, an exposure of several hours to the flames only resulting in the timber becoming carbonised to the depth of a fraction of an inch.

PAT. WIRE GAUGE FIRE RESISTING SHUTTERS.

The principle of the Miner's Davy Safety Lamp suggested the use of wire gauze for the protection of openings against fire from an adjoining or opposing building.

	Prices: Per sup. ft. £ s. d.
Fire resisting doors, up to 35 sup. ft., from	0 3 0
Ditto, shutters (same principle), from	0 3 0
Wire gauze shutters, on iron frame	0 3 9
Ditto, including erection	0 4 6
Wire glass windows, in iron frame, including erection ..	0 7 6
Labour erection of doors and windows, each, from ..	1 10 0
Fitting, each door, sliding or hung, from	2 15 0
Automatic attachments from	1 0 0

See advt., page 20.

FIRE SPRINKLERS.

The " Grinnell " Automatic Sprinkler and Fire Alarm.

The " Grinnell " Drenchers, and **" Acme "** ditto for roof or window.

Prices for Sprinklers and Drenchers from £2 per point upwards, according to plan of building and distribution of sprinklers.

One Sprinkler has the recognised covering capacity of 100 sup. ft.

See advt., page 20.

The " Simplex " Portable Chemical Cylinder—

Price with tap or hose, 3 gal. size, including one charge of soda bi-carb. and sulphuric acid, £3. Useful for isolated buildings.

The " Sentry " Fire Tank, with 6 buckets and one chemical charge, £3/15/–.

The " 20th Century " Chemical Fire Extinguisher Cylinder, tested to 350lbs. pressure, made in copper—size, 2ft. x 6in. dia., £3/10/–.

Agents: 90 Pitt-street, Sydney; 31 Queen-street, Melbourne.

Buildings fitted with above appliances are allowed a liberal discount off premiums of 37½ per cent. by Insurance Companies throughout Australia.

The " Walker " Chemical Cylinder needs to be turned upside down for full operation.

If the whole contents are not required, turning right end up again stops the action.

Made in burnished copper, tested to 350lbs per square inch.

Stock size on hand in agent's advt., page 6

Size ..	1 gal.	2 gal.	3 gal.	4 gal.
Price ..	1 12 6	2 15 0	3 7 6	5 0 0

A Quick Fire Extinguisher is carbonic acid gas under pressure; or a solution of **Pearl Ash** in water thrown upon fire.

Fire Hydrants, single outlet, coupling and nozzle complete, £3/10/–. Wheel Valves, each £1/15/–.

Diam. pipe	1in.	1¼in.	1½in.	2in.	2½in.	3in.
Foot valves and Strainers, gal.	3/3	3/9	4/6	6/6	10/6	15/–
Strainers only ..	2/–	2/6	3/3	3/9	5/3	7/–
Fire Hose Nozzles with male ends	—	8/6	10/6	12/6	25/–	—

Keys, for coupling, each 2/6.

Vulcanite Hydrant Balls, 3in. dia., 33/–; 3½in., 42/– per doz.

Fire Hose, " Rob Roy " Canvas, unlined, in 100 yard coils, 2½in. dia., per ft., 1/4.

FIRE RESISTING SUBSTANCES.

" Alpinite " Fibre, packing for floors and walls, in bales 1½ cwt, 35/–. Covering 40 square yards, 4in. thick, floors and ceilings.

Or ,, 30 ,, ,, walls, cavities, partitions.

Asbestos Cement, loose in bags, 14/– to 20/– per cwt.

See advt., page 39.

Silicate Cotton, a mineral fibre, is used for preventing the radiation of heat and deadening sound.

1 cwt. will cover 90 sq. ft., 1in. thick, price 20/– per cwt.

PLANT AND TOOLS.

MACHINERY AND APPLIANCES.

Present list of prices attached for portion of contractor's plant and tools not referred to previously throughout this work. For the convenience of contractors, and not for the purpose of advertising firms.

Adzes, Fencers', 4/6 ; 6in. Railroad, 6/3.

Air Propellers and Exhaust Fans (Aland's).—12in., £5 ; 24in., £8/10/– ; 36in., £16/10/– ; 48in. dia., £23/10/–.

Augers.—Post-hole Digger (Hurd's), 6in., 12/6 ; 9in., 15/– ; Universal earth, 25/–.

Axes.—Squaring, 12in. blade, 9/– ; Collins & Kelly's 5lb. handled, 4/– ; Mortice Axes, double end, 10d. per lb.

Hatchets.—Lath and Shingling, 1/9 ; Claw, 2/3 ; Carpenter's Bench, 4in., 2/2 ; 6in., 4/–.

Asphalt Cauldron, 20 gallons, on wheels, £15.

Barrows.—Navvy, wood, with wrought iron wheel, 15/– to 16/– each. American garden, movable sides, 17/6 to 20/– ; Galv. Iron, 23/6 ; All steel, 40/– ; Pan-American, with steel trays, 25/– ; Heavy wood, 25/– ; **Samson** truck, 25/–.

Brick Carts, £12 to £20 ; Cart Harness, £5/10/– ; 4-wheel Tray Waggon, £30 to £50 ; Builders' Hand Carts, £5 ; Spring Cart, £10 to £15.

Buckets.—Galv., 3 gal., 18/– per doz. ; 5 gal. (strong), 40/–. Round Well Galv. Bucket, with valve in bottom, 40 gals., 84/– ; 25 gals., 75/–. Patent Fire Buckets, 45/– per dozen.

Boring Machine (wood).—Set of 7 bits, 50/–.

BLACKSMITH'S PLANT.

Anvils, 50/– per cwt. Forge tools, per lb., 8d.

Bellows.—(Alldays & Onions), 18in., 35/– ; 24in., 60/– ; 30in., 95/– ; 36in., £8/5/– ; 42in., £15/15/–. **Tue Irons,** 4/– each ; Water Tue Iron, 11/– each.

Forges.—Portable Round Bellows, 18in., 80/– ; 24in., 120/–. Portable, with Fan Blast, 18in., 70/6 ; Champion's Steel Ball-bearing, 10in. blower, £9/8/– ; American, 40 x 28 hearth, with Fan Blast, £8.

Vyces.—Leg Vyces, to 25lbs., 6d. per lb. ; Peter Wright's Vyce, 4½in. jaw, 60/–.

Tongs.—3lb. each, 8d. to 10d. per lb.

Swage Blocks.—All sizes, 21/– per cwt. 16in. x 16in. =2 cwt., 42/–. Swages, 2/– each ; Cutters, 3/–, or per lb., 1/3. Handled Punches, ⅜in. to ¾in. — 2/6 each.

BELTING.

Width, inches	1	1½	2	3	4	5	6	8	10	12
Heavy Single										
Belt, per ft.	4d.	6d.	8d.	1/–	1/4	1/8	2/–	2/8	3/4	4/–
Special qual.,	5d.	7½d.	10d.	1/3	1/8	2/1	2/6	3/4	4/2	5/–
Best (ex.hvy.	6d.	9d.	1/–	1/6	2/–	2/6	3/–	4/–	5/–	6/–
Raw Hide Belting, per foot—										
Single ..	4d.	6d.	8d.	1/–	1/4	1/8	2/–	2/8	—	—
Double ..	—	—	1/4	2/–	2/8	3/4	4/–	5/4	6/8	8/–
3 ply ..	—	—	—	—	4/–	5/–	6/–	8/–	10/–	12/–
Patent Double Edged Leather Belting—										
Width, inches	2	3	4	6	8	10	12	14	16	18
Per foot ..	1/–	1/6	2/–	3/–	4/–	5/–	6/–	7/–	8/–	9/–
Double Belt—										
Light, per ft.	1/2	1/9	2/4	3/6	4/8	5/10	7/–	8/2	9/4	10/6
Heavy, per ft.	1/4	2/–	2/8	4/–	5/4	6/8	8/–	9/4	10/8	12/–
Double Belt, Heavy, with specially woven canvas insertion—										
Width, inches	2	3	4	6	8	10	12	14	16	18
Per foot ..	1/6	2/3	3/–	4/6	6/–	7/6	9/–	10/6	12/–	13/6
3 ply Belting—										
Per foot			4/–	6/–	8/–	10/–	12/–	14/–	16/–	18/–
Balata Belting—										
Width, inches ..	1	1½	2	3	4	6	8	10	12	
3 ply, per foot. ..	3½d.	5½d.	7d.	11½d.	1/4½	2/1	—	—	—	
4 ply, „ ..	—	—	—	1/4¼	1/10	2/9½	—	—	—	
5 ply, „ ..	—	—	—	—	—	3/5	4/8	6/6	7/7	
India Rubber Belting—										
3 ply, per foot ..	3¾d.	5¼d.	8d.	1/–	—	—	—	—	—	
4 ply „ ..	—	—	—	1/2	1/8	3/–	4/–	5/10	7/–	
Pump (" Cup ") Leathers—										
Outside dia., in.	2	2¼	2½	3	3½	4	4½	5		
Each	9d.	10d.	1/–	1/1	1/3	1/8	2/–	2/6		
Outside dia., in.	6	8	9	11	13	15	17	20	24	
Each	3/3	5/–	5/6	7/6	10/–	12/6	15/6	21/–	28/–	

Odd Widths of Belting also in Stock. (*See* maker's advt., pages 28, 52.)

Chains.—Best Short Link, per cwt., ⅜in., 45/–; ½in., 35/–; ⅝in., 30/–; ¾in., 28/–.

CRAB WINCHES.

	Load.	Single Purchase.	Double Purchase.
	cwt.	£ s. d.	£ s. d.
To lift direct with brakes,	16	6 0 0	7 0 0
„ „ „ „	20	6 15 0	8 10 0
„ „ „ „	25	8 10 0	9 0 0
„ „ „ „	30	9 10 0	10 10 0

50 cwt., £15 ; 60 cwt., £20 ; 80 cwt., £30.

CRANES.

Jib Crane.

Hand power, with separate drums ..	2 tons	50ft. jib	£62
Braced mast	5	65 „	£95
Steam, braced mast and jib ..	5 „	70 „	£420
Electric	5 „	70 „	£456

Cranes.—Warehouse Wall Cranes, with chain, 150ft., and Crab Winch, 4ft. swing "gallows," on brackets top and bottom, 10 cwt., £15/10/–.

Cramps.—Joiners, 4ft., 14/– ; 6ft., 16/–. Sash, 30in., 11/6 ; 36in., 12/6. Floor, 17/6 each. Floor-dogs (Kimberley's), 16/– per pair. Floor (Woodhead's), 35/– each. Ceiling, 4 to 8lbs., 25/– to 30/– ea.

CONCRETE MIXERS.

(*See* pages 89, 97, 98 ; also agents' advts.)

"London" Automatic Continuous Concrete Mixer, showing Double Mixing Trough with Blades.

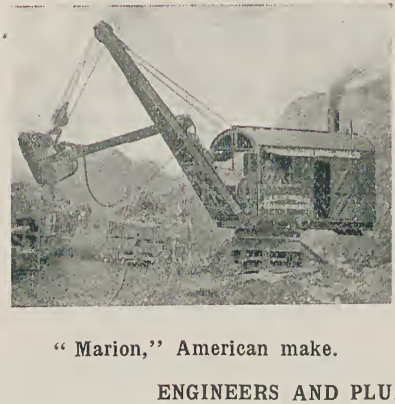
Crowbars.—Steeled Diamond Point and Heel, 3½d. per lb. Approximate weight, 4ft. 6in. x 1⅛in. = 15lbs. ; 6ft. x 1½in. = 35lbs.

COUNTER SHAFTS AND DRIVING PULLEYS OVERHEAD.

Dia. Driving Pulley. Inches.	Pulley Main Belt. Inches.	Dia. of Shaft.	Price with one Driving Pulley.
12	4	⅞	40/–
14	5	1	50/–
16	6	1⅛	60/–
18	7	1¼	70/–
21	8	1⅜	90/–
26	9	1⅝	120/–
30	10	1¾	150/–
32	12	2	200/–
36	14	2¼	250/–
40	16	2½	325/–
44	18	3	425/–

(*See* Scrutton & Co.'s advt., outside cover.)

Joiners' Mortise Machine, foot power, £7 ; hand power, £16.



Earth Excavators or Steam Shovel (on rails).

(English and American makers.)

Sizes from ¾ to 2¼ c. yard capacity shovels.

(*See* Excavator.)

£1000 to £1600 each, delivered City.

For particulars *see* agent's advt. pages 13, 14, 19, 35, 44 (outside cover).

" Marion," American make.

ENGINEERS AND PLUMBERS' TOOLS.

Bolt Cutters (Boker's)—for small rods, 4/6 ; ⅜in. dia., 11/6 ; ½in., 16/ ; ⅝in., 21/–.

Pipe Vyces—4/6, 8/6, 10/6, 18/–, 21/–.

Pipe Wrenches—

	⅛ to ¾in.	⅛ to 1½in.	¼ to 2½in.	¾ to 4in.
Chain	8/6	10/6	21/–	27/–
	8in.	10in.	14in.	18in.
Stillson ..	3/6	4/6	5/6	7/6
	5¾in.	7in.	9in.	12in. 14in. 16in.
Footprint ..	1/–	1/6	1/9	2/6 3/6 5/6

Adjustable S Wrench, 8in., 2/6 to 14in., 5/6.

Cyburn Spanner, ⅝in., 3/3 ; to 2¼in., 16/–.

Malleable Double End Spanners, for Hexagon Nuts, from 1/–.

Cutters.—" Daniel's," 3-wheel pipe, to cut up to 1in. dia., 14/– ; to 2in., 22/6 ; to 3½in. dia., 30/– each.

Drilling Machines, Engineer's Hand Bench, from £3/10/–.

Drills.—Archimedian, No. 3, 8/– ; No. 12, 12/6 per doz.

Goodall's Automatic Chain, No. 307, 7/9 each.

Tongs.—Ordinary Pipe Tongs—

To take pipe, in.	½	¾	1	1¼	1½	2	2½	3
Each	1/9	2/3	2/6	3/–	3/6	5/–	6/6	7/6

Snips.—Straight, Matheson's, 3/6 ; bent, 4/–. **Soldering Irons,** ¼lb. to 3lbs., 2/– per lb. **Rivet Sets,** 2/3. **Screw-driver,** 8d. to 2/- ; **Plumber's Dresser,** 2/6. **Bossing Mallett,** 1/3. **Bossing Stick,** 1/10.

PLUMBER'S LEAD MELTING POTS.

Capacity—Gallons ..	¼	½	1	1¼	1½	2	2½

ENGINES.

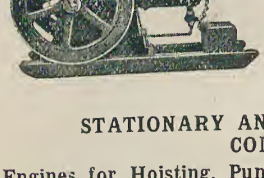
Prices as under, obtained at the Sydney Agricultural Show, 1914, for convenience of Contractors, and not for advertising the firms.

PORTABLE ENGINES (Marshall's).

Single Cylinder.				Double Cylinder.			
h.p.	Cash.	Weight.		h.p.	Cash.	Weight.	
	£	ton	cwt.		£	ton	cwt.
2	165	1	19	10	465	7	6
3	210	2	19	12	530	7	16
4	240	3	8	14	590	9	19
6	310	5	1	16	660	10	13
8	365	5	19	*20	800	14	2
10	420	7	—	* Fitted with 2 fly-wheels.			

(Scrutton & Co., agents. *See* outside cover.)

Traction Engines.—" Foster " or " McLaren's " single cylinder, 6in. x 9in., 4 h.p., £600. Compound, 4 h.p., £650 ; 8 h.p., £700. To draw 30 tons on a level road, £1000.



STANDARD GAS or GASOLINE ENGINE.

3½ h.p. £48 0 0

In 3 sizes—1½, 2½, and 3½ h.p.

STATIONARY AND PORTABLE GAS AND OIL AND COMBUSTION ENGINES.

Engines for Hoisting, Pumping and Electrical—
Gas or Kerosene Oil Engine, " Melvin's Otto," from ¾ h.p. upwards. 4 h.p., £85 ; 7½ h.p., £180.
Gas consumption, 16 to 20ft. per h.p. per hour.
Oil consumption, ⅝ to 1 pint per h.p. per hour.
Combustion Engine, 3 h.p., Scottish " Max " Motors, £20.

PETROL SINGLE CYLINDER ENGINES.

	£	s.	d.		£	s.	d.
4 cycle, 3½ to 4 h.p. ..	55	0	0	2 cycle, 7 h.p. ..	50	0	0
4 cycle, 7 to 9 h.p. ..	95	0	0	2 cycle, 2½ h.p. ..	50	0	0

Obtain catalogues and *see* agent's advt., pages 14, 19, 35, 44, and outside cover.

Fencing Spuds, each 8/–.
Grindstones, Colonial—12in., 3/6 ; 16in., 4/6 ; 20in., 6/– ; 24in., 7/6 ; 30in., 12/– ; 56in., 30/– ; 60in., £5.
Forks, Stone, " Skelton's "—10 tine, 10/– ; 12 tine, 13/–.
Hammers.—Carpenter's, to 3/9 ; Slaters', 3/9 ; Bricklayers', 2/6.
Sledge, S. & D. face, 7lbs. and up, 5½d. per lb.
Drill Hammers, per lb., 6d.
Quarry Mauls, per lb., 6d. Napping, 1¼lbs., 1/5 ; 2lbs., 2/–.
Engineers' Ball Peins, without handles, ½lb., 6d. ; 1lb., 8d.

HORSE GEARS.

Bentall's make, Pyrmont.

Two-horse gear, 42in. driving wheel, reversible clutch, separate intermediate, with renewable cast bearings, weight 12½ cwt., £22/15/–.

One-horse, 36in. driving wheel, ditto, weight 10 cwt., £19/15/–.

Ditto, light gear, weight 5½ cwt., £13.

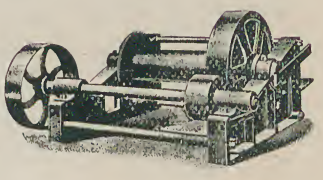
HOSE—LEATHER DELIVERY.

Diameter, inches ..	2	2½	3	4	5	6	8	10	12
Per foot	2/8	3/4	4/–	5/4	6/8	8/–	10/8	13/4	16/–

Loudowici's advt., *see* pages 28 and 52.

HOISTS—BUILDERS' FRICTION HOISTS.

(2ft. x 12in. Drums.)



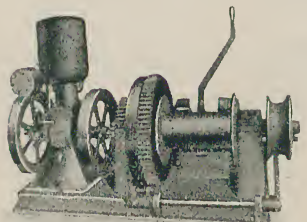
Lifting, Lowering and Sustaining, controlled by one lever only. Power required from 4 to 7 h.p. motor, according to speed.

Price, Hoist only, £37/10/–.

Farmer Bros. Friction Hoists—

To lift	Size of Barrel for chain. Dia. Length.	Size of Pulley.	Approximate Weight.	Prices.
	in.	in.	cwt.	£ s. d.
3	6 x 21	16 x 4	4½	8 10 0
5	7 x 24	18 x 4	6	11 10 6
10	8 x 24	24 x 4	8	14 10 0
15	8 x 27	24 x 5	11	19 0 0
20	9 x 30	27 x 6	15	24 0 0

With large drums for wire rope at an extra cost.



CONTRACTORS' HOISTING SELF CONTAINED OUTFITS.

With "Novo" Combustion 6 h.p. Engine.

Used with Double Platform Elevator operated by a cable from sheave; the weight of platforms balance each other, one up and one down, with auxiliary drum for separate hoisting.

Price .. £170

See machinery agents' advt., page 13, 14, 19, 35, 44, outside cover.

Hydraulic Jack, Tangyes' (ship pattern), 50 tons, each .. £20 0 0
Ditto lift from foot pedestal, 50 tons, each 18 0 0

Trewhella Bros. Pat. Lever, for lifting posts, boulders, rolling logs—
To lift, single purchase, 2½ tons, weight 53lbs. £2 0 0
,, double purchase, 4 tons, weight 65lbs. 3 5 0
,, special, 6 tons, weight 79lbs. 6 10 0
To lift 8 tons, £5/15/–; 10 tons, £6/10/–.
(With automatic lowering gear.)

Trewhella Hand Winch Grabber, or Forest Devil, for pulling down trees with wire ropes.
Power—12 tons direct from drum, and 24 tons with snatch block.
Weight of plant, 500lbs., price, equipment complete .. £22 10 0
Ditto, with horse grabber and full equipment .. 37 10 0

Shaw's Post Lifter, £2/10/–; racket and lever wheel and chain, extra, £2.

Screw Lifting Jacks, wrought iron, **bottle,** and brass nut—

Tested to tons ..	1	2	4	6	8	10	20
Price	8/–	12/–	20/–	27/–	35/–	50/–	£5

Leg traversing Jack, wrought iron and malleable cast iron base, to lift 20in., top and bottom ratchets—
5 tons, to travers 7in. £3 1 0
10 tons, to travers 10in. 4 0 0
15 tons, to traverse 12in. 4 15 0
20 tons, to traverse 18in. 8 4 0

Jacks, steel buggy, each 4/6.

LADDERS.

Adjustable Slide Ladders, from 2/6 per foot.
Heavy, Bricklayers', Oregon sides, H.W. rungs, bolted, 1/6 per foot.
Medium, Plasters and Carpenters', ditto, bolted, 1/– per rung.
Painters' and Stock Ladders, Oregon sides, H.W. rungs, riveted—

10ft.	15ft.	20ft.	30ft.	40ft.	50ft.
12/–	18/–	25/–	40/–	50/–	60/–

Step Ladders, light, with hinged stays and cords—

Long 5ft.	6ft.	8ft.	10ft.
Price 10/–	12/–	16/–	20/–

Extension Step Ladders, 5ft. to 8ft., 10/6; to 10ft. to 18ft., 21/–.
Trestles for Paperhangers, 2/6 per foot.

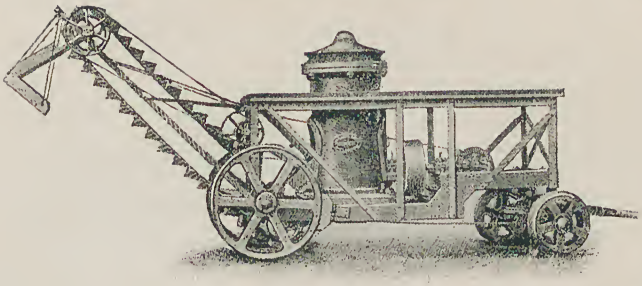
LEVELS.

Mason's, 3/–. Carpenter's, 5/–.
9in. Dumpy Level in case, with tripod stand, from £6/15/–.
Levelling Staff, painted, 10ft. long, folding, £1/12/6.
Telescopic Staff, from £6/10/–.
Post Hole Digger, auger cutter, " Hinds'," for earth holes—

Diameter, inches ..	6	9	10½	12½
Price	10/–	12/6	15/–	17/6

Plow—Road, with steel beam and handles—

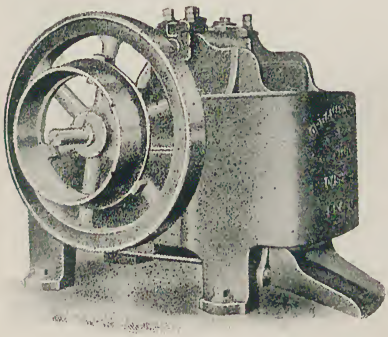
Inches	7	10	12	14
Price, with extra share	£3	£4/8/–	£5	£6



Jaque's Rotary Stone Breaker, on carriage, with elevator and screen—
(Prices fluctuate.)

Output of 2½in. metal per hour.	Weight of above complete plant.	Power required to drive.	Machine only.	Complete without Engine f.o.b. Melb.
tons.	cwt.	h.p.	£	£
4 to 8	96	8 to 10	114	245
6 to 12	142	12 to 15	150	370
10 to 20	180	20 to 25	237	538

A small machine, 4 to 5 h.p., price 87. (*See* advt., page 14.)



C 1 Stone Breaker or Ore Crusher.

(Ord & Maddison's, Ltd.)

Reversible jaws, adjustable, 16in. x 9½in. size of mouth.
Output of 2½in. gauge metal, 7½ to 12 tons.
5 h.p. engine required.
Price .. £190

See advt., p. 9.

See also advt., pages 13, 14, 19, 35, 44, and outside cover.

BALLAST ROLLER.—Can be loaded with Water or Sand.

Width and Diameter.	Weight Empty. cwt.	qrs.	lbs.	Weight Full. cwt.	qrs.	lbs.	Price. £	s.	d.
18 x 18 inches	2	2	0	3	3	0	4	10	0
21 x 21 ,,	3	1	0	5	1	0	6	0	0
24 x 24 ,,	4	1	0	7	0	0	7	5	0
27 x 27 ,,	6	2	0	10	0	0	9	5	0
30 x 30 ,,	8	2	0	13	2	0	14	10	0
30 x 30* ,,	9	0	0	14	0	0	16	10	0

* With both shafts for pony and handle for manual power.

SAWS.

Cross-cut, 4½ft., 6/6; 6½ft., 9/9.
Lightning Tooth, 3ft., 5/–; 5ft., 8/–.
Hack Saws, for cutting metal, 4/–.
Best Hand, Carpenter's, from 4/–. Rip Saws, 6/–.
Circular, Disston's, 24in. diameter, 30/–; 36in., 65/–.
Sawyer's Bench Gauge, left or right hand, £5.

SCREENS—CONTRACTORS AND BUILDERS'.

In Wood Frame, very strong. Any size made to order.

Mesh, inches ..	⅛	3/16	¼	⅜	½	¾	1
Each	30/–	28/–	27/–	26/–	25/–	24/–	20/–

Shovels, Navvy, D.H.S.M., 3/3 to 4/9.
Shovels, post hole, 3/6. Spades, 4/–. Picks, 3/6.

STEEL.

Steel Quarry Wedges, 33/– per cwt., or 4d. per lb.
,, Wood Wedges, same price as above.
,, Octagon Mining, or drill steel—⅜in., 32/– per cwt.; ½in. to 1½in., 30/– per cwt., or 4d. per lb.
,, Square and Round Cast Tool Steel, ½in., and up, 55/– per cwt., or 7d. per lb.
,, Spring, Blister Steel, for boring tools, 25/– per cwt., or 3½d. per lb.
,, Picks, 3/9 each.

Tapes, Metallic, measuring 33ft., 5/–; 66ft., 7/–; 100ft., 10/–.
Tramways and Trucks. *See* Excavation.

Vyces, Tube, No. 1, 9/–; No. 2, 10/–; No. 3, 16/– each.
Vyces, Blacksmiths', Leg, 3in. to 4½in. jaw, per cwt., 52/6.

WHEELS.

Wrought Barrow, with fixed Spindles and Gudgeons—
14in., 4/9; 16in., 5/3; 18in., 5/9 each.
Cast Iron Navvy Barrow Wheels, without fittings—
16 x 1¾in., 3/3; 17 x ¾in., 3/– each.
Cast Iron Truck Wheels (Plain Rim), light—

Inches ..	6	7	8	9	10	12	14	16	18
Per pair ..	1/3	1/6	1/9	2/3	3/–	4/6	5/6	7/–	9/–

Cast Iron Truck Wheels, Heavy.—All sizes at 21/– per cwt., or 3d. per lb.

CAST IRON FLANGED TRUCK WHEELS.

Inches	6	8	10	12
Each	2/6	3/6	4/6	5/6

Pedestals for Flanged Truck Wheels, to take 1¼in. axles, 4/6 per set.

(*See* advt., pages 13, 14, 19, 35, 44, and outside cover.)

HYDRAULICS.

MEMORANDA.

To convert head in feet into pounds pressure per sq. inch, multiply by .434.

To convert pressure per sq. inch into head in feet, multiply by 2.31

To find the horse-power in water, multiply the quantity in cub. feet per minute by the head of water in feet, and the result by .0016098. Result is based on an efficiency of 85 per cent. in the water wheel.

Doubling the diameter of a pipe increases its capacity four times.

Theoretically, water can be raised by suction 33ft., but practically only 26ft. to 29ft.

Height of tank being known, to find diameter of tank needed for any capacity: Divide quantity desired by .0034, divide remainder by height in inches and obtain sq. root. The value thus obtained is the diameter in inches, divide by 12 to obtain diameter in feet.

To find capacity of tank in gallons: Square diameter in inches, multiply by height in inches, multiply by .0034, the product is the capacity in gallons.

ESTIMATING THE H.P. OF STREAMS.

Ernest Muller, A.M.I.M.E., consulting engineer, London, S.W., writes:—

"As consulting engineer for water turbines, &c., when calculating a number of horse-power of a stream, estimate the number of cub. ft flowing in a stream per minute, multiply it by the distance the water has to fall, and then multiply this by 0.0014, and you will get the actual number of horse-power obtained by a plant with 75 per cent. efficiency.

"The figure 0.0014 is obtained as follows:—The weight of a cub. ft. of water (62.321), multiplied by efficiency (0.75), the total divided by 33.00 = 0.0014175."

1 **cubic foot** per second equals 374 imp. gallons per minute.

1 **cubic foot** of **fresh water** weighs 62.5lbs., and contains 6.232 gals.

1 **cubic foot** of **sea water** weighs 6.425lbs.

1 **cylindrical foot** weighs 49.08lbs., and contains 4.894 gals.

1 **gallon** weighs about 10lbs.

8 **gallons** measure 1 bushel.

VARIOUS WATER PIPES.

	Weight and price per foot run.					
	Wood.		Cast Iron.			Steel Riveted.
Pipes.	Weight			Weight		12 gauge.
in. dia.	lbs.	Price.	in.	lbs.	Price.	Price.
6	9	1/9	$\frac{1}{2}$	32	2/8	3/-
8	$10\frac{1}{2}$	2/4	$\frac{1}{2}$	42	3/9	3/8
10	$14\frac{1}{2}$	$3/1\frac{1}{4}$	$\frac{5}{8}$	65	5/5	4/9
12	$16\frac{1}{2}$	$3/7\frac{1}{2}$	$\frac{5}{8}$	$77\frac{1}{2}$	6/11	5/4

THE PRESSURE OF WATER AT DIFFERENT HEADS.

(Per Square Inch.)

Head of water. ft.	Pressure. 4 lbs.	Head of water. ft.	Pressure. lbs.
1	.433	100	43.3
2	.86	110	47.6
3	1.3	120	52.0
4	1.73	130	56.3
5	2.16	140	60.6
6	2.6	150	65.0
7	3.03	160	69.3
8	3.46	170	73.6
9	3.9	180	78.0
10	4.33	190	82.3
20	8.66	200	86.6
30	13.00	210	91.0
40	17.33	220	95.3
50	21.66	230	99.6
60	26.00	240	104.0
70	30.33	250	108.3
80	34.66	260	112.6
90	39.00	270	117.0

SIZES OF PIPES FOR WATER.

Table of approximate suitable diameters of pipes for conveying different quantites of water. For short mains up to 200 yards long, the diameter of pipe is not of much importance, but when they exceed 200 yards in length the diameters given in this table are desirable :—

Gals. per min.	Dia. of pipe.	Weight of 100ft. cwt.	qrs.	lbs.	Gals. per min.	Dia. of pipe.
½	½				60	4
¾	¾	0	3	0	100	5
1½	1	1	0	5	160	6
3	1¼	1	1	22	220	7
5	1½	2	1	10	300	8
10	2	2	3	2	450	9
15	2½	4	0	6	500	10
20	3	6	0	8	800	12

Steel Angle Ladders for Wells or Windmills, constructed of angle steel in sections 8ft. to 12ft. ; the steps are riveted to the uprights. Price, per foot, 1/6.

Steel Steps, to bolt on alternate sides of delivery pipes of deep well pumps as a means for descending wells. Price, each 1/–.

PUMPING OUTFITS—CONTRACTORS.

10in. dia. **Diaphragm (Rubber) Pattern Pump**, direct connected to a 1½ h.p. or 2½ h.p. "Novo" engine.

On skids, for 3in. suction pipe .. .. .. £ 48 s. 0 d. 0

Machinery agents' advt., pages 9 and 14.

EDISON'S DIAPHRAGM BILGE PUMPS.

Hand Power Suction Pumps.

For Water containing Sand and Mud.

				£	s.	d.
No. 2—2½in.	Suction Pipe, capacity	1800 gals.	per hour ..	5	5	0
No. 3—3in.	,, ,,	4000 ,,	,, ..	6	5	0
No. 4—4in.	,, ,,	6000 ,,	,, ..	9	10	0

SEMI-ROTARY OR WING PUMPS.

Lever hand power. Will draw water 25ft. and force to 150ft. vertical.

No. of Pump ..	0	1	2	3	4	5	6
Price	20/-	24/-	30/-	35/-	42/-	50/-	60/-
Capacity in gals. per min.	4	5	6	9	13	19	22
Pipe suitable for Pump	½	½	¾	1	1¼	1½	1½
	14	16	18	22/6	29/-	32/-	37/6

Household Iron Pumps, from £1 15 0

Ditto, Brass do. 2 0 0

Douglas Lift Pumps—Nos.	2	3	4	5	6
	10/6	11/6	12/6	16/-	18/-
Size of pipe required	1¼		1½		2in. dia.

Douglas Force and Lift Pumps, No. 3, 42/- ; No. 4, 45/- ; No. 6, 57/6

CENTRIFUGAL PUMPS.

These pumps, like the Californian pump and water lifts, will raise water mixed with sand or clay without injury to the pump.

They are made to work in a horizontal or vertical shaft with a pulley and endless band.

Suction pipes, with elbow and foot valve, also extra shafting, can be had with pumps.

Speed and Power List for Centrifugal Pumps.

Size of Pump.	Size of Driving Pulley.	Water raised per minute. Approx. gals.	Horse Power Required.	£	s.	d.
2in.	4in. x 3in.	50 to 75	2	14	0	0
3in.	4in. x 4in.	100 ,, 150	2	16	0	0
4in.	5in. x 5in.	200 ,, 300	3	17	0	0
5in.				27	0	0
6in.	8in. x 6in.	500 ,, 750	7	28	0	0
8in.	10in. x 9in.	1050 ,, 1575	11	45	0	0

Correct in direct line to output.

See machinery advts., outside cover and pages 13, 14, 19, 29, 31, 35, 44.

WINDMILLS AND PUMPS.

Ball-bearing, Back-geared, Self-regulating.

30ft. Angle Steel Derrick, without mill, £10/15/–; £11. Fixing same, 30/– to £3.

Size of Mill. ..	6ft.	8ft.	10ft.	12ft.	14ft.	16ft.
Geared Mill with 30ft. Gal. Steel Tower	£13	£18	£25	£33	£45	£59
Geared Mill with Steel Tower to bolt to Wooden Tower	£9	£12	£17	£22/10/–	£34	£48

Labour.—Raising and fixing, cost, from £2 to £5.

Californian Pumps or Water Lifts, with endless chain and buckets, hand power, from £4 upwards.

WIND MOTORS AND PUMPS.

Mill. ft.	Pump.	Well. ft.	Approx. cap. Gals. per hour.
6	2¾	50	100
8	3	75	150
10	3½	100	300
12	3½	100	300

	£	s.	d.
Artesian and Deep Well Lift Pump, for 2⅜ brass barrel for 1¼ pipe £3/10/– to	5	10	0
Artesian Well Cylinder, 2⅜ internal dia., for 2½ pipe ..	4	0	0
" Bulldoser " Power Lift Pump, upright pattern, direct power to piston, to lift 200ft., 2 h.p. required, 2 drive wheels	15	12	0
" Bulldoser " (" Myers' "), horizontal pattern, 200ft. lift, 2½ h.p. required, 200 gals. per hour	19	0	0

ANGLE STEEL TANK STANDS.

Complete with H.W. Decking.

To carry Tank—	10ft. high.	15ft. high.	20ft. high.	30ft. high.
Gals.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
1000	5 10 0	7 7 6	7 15 0	10 10 0
2000	9 5 0	12 0 0	12 10 0	21 0 0
3000	15 0 0	20 0 0	20 17 6	26 15 0
4000/5000	15 15 0	24 10 0	26 15 0	38 15 0

PATENT SQUATTER'S STEEL TANK (Metters').

With 20 gauge inside and outside clamps, 1½ x ½in., for clay or concrete bottoms.

Tanks.	Weight.	Gal. Steel.	Black Steel.	Steel Bottoms.	Gal. Iron Stands extra.
gals.	cwt.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
4,000	9	12 0 0	9 10 0	21 10 0	2 0 0
5,000	9	13 5 0	10 10 0	25 15 0	2 5 0
10,000	13	19 5 0	15 5 0	45 0 0	3 5 0
20,000	18	26 10 0	21 0 0	68 10 0	4 10 0

Hydraulic Ram.—No. 4 size requiring a water supply of from 3 to 7 gals. per minute, with discharge pipe, ¾in. bore, will cost about £3, with pipes added.

This is the most simple and effective machine for forcing a continuous stream of water by gravitation to a considerable altitude, saving the power required in using a force pump. It will work with even 18in. fall of water and does not easily get out of order.

For ordinary purposes in conveying water about 300 yards, about one-seventh of the water can be raised and discharged at an elevation five times as high as the fall, or one-fourteenth part high as ten times as the fall applied. Thus with a fall of 5ft. of every 7 gals. drawn from the fountain, 1 gal. may be raised 25ft., or half a gallon 50ft. The distance from the fountain to the ram should be from 25ft. to 50ft., and all sharp bends should be avoided in the piping.

Danks' Hydraulic Rams, No. 2, 40/–; No. 3, 47/–; No. 4, 58/6; No. 5, 92/–; No. 6, 165/–.

See advt., page 37.

Automatic Hydraulic Rifle Ram, New York, to work from 2 to 3ft. head of water upwards—

1¼in. drive pipe, 2½ to 5 gals. per minute through ¾in. del. pipe .. £18
2¼in. drive pipe, 7 to 16 gals. per minute through 1in. del. pipe .. £38
4in. drive pipe, 30 to 45 gals. per minute through 2in. del. pipe .. £80
12in. drive pipe, 375 to 750 gals. per minute through 5in. del. pipe £140

THE PULSOMETER STEAM PUMP.

A simple and cheap apparatus for raising water and other liquids by direct power or pressure of steam. A good feature of the Pulsometer is the simplicity with which the few wearing parts can be immediately replaced.

It will work on a constant suction without attendance, or as long as the steam and water are supplied to it. It requires no lubricant, oil, tallow, or packing, and needs no skilled attendance.

The Pulsometer will also raise water mixed with mud, sand, &c.

Sizes and Capacities.

No.	Steam Supply Pipe. Size.	Suction Pipe. Size.	Delivery Pipe. Size.	To Lift 15ft. approx. gals. per hour.	£	s.	d.
1	¼in.	1¼in.	1in.	600	9	15	0
2	½in.	2in.	1½in.	1000	15	10	0
3	½in.	3in.	2in.	2500	22	0	0
4	½in.	4in.	2½in.	4000	30	0	0
5	¾in.	4½in.	3in.	6000	39	0	0

ROPES, CHAINS.

BLOCKS.

Ropes and Chains.

The strength of the best Manilla ropes varies as much as rod oi bar iron, portions of the same rope will sometimes vary 20 per cent Exposure for two or three months to bad weather when the ropes are alte nately wet or dry weakens them rapidly reducing thei strength to one half. Tarring ropes also weakens them, the best preservative is to keep them dry and under cover.

Rope, Weight and Strength.

Rule.—For weight in pounds per fathom of three-strand hemp rope, square the girt and multiply result by ·26.

Breaking strain in cwts., square the girt and multiply result by 5·6. Thus, a 3-inch rope would weigh 2 34 lbs. per fathom, and the breaking strain be 50·4 cwts.

Example $3^2 = 3 \times 3 = 9$.
$9 \times \cdot 26 = 2\ 34$, the weight in lbs. per fathom.
then $9 \times 5 \cdot 6 = 50 \cdot 4$, breaking strain in cwts.

Best Quality Manilla Ropes.

Weight per fathom.	14oz.	1¼lb.	2¼lbs.	2¾lbs.	3½lbs.	4¼lbs.	5½lbs.	6½lbs.	7½lbs.
Girt in inches	2	2½	3	3½	4	4½	5	5½	6in.

Best Galvanized Wire Rope.

Weight per fathom	1lb.	1lb. 8oz.	3lbs. 8oz	5lbs. 8oz	7lbs.	12lbs.
Girt in inches	1	1½	2	2½	3	3½

WEIGHT AND STRENGTH OF SHORT LINK CHAINS.

	in.	in.	in.	in.	in.	in.	in.
Diam. of iron links	5-16	6-16	7-16	8-16	9-16	10-16	11-16
Weight per fathom	5¼lbs.	8lbs.	11 lbs.	14lbs.	18 lbs.	23lbs.	28lbs
Proof strain in cwts.	25½	36¾	51¼	65½	85	102	127
Diam. of iron links	¾	13-16	⅞	15-16	1	1⅛	1¼
Weight in lbs. per fathom	32	38	44	50	56	71	87
Proof strain in cwts.	147	177	200	236	268	334	408

To find the weight which ordinary short-link chains will bear with safety :—

Multiply the square of the diameter (reckoned in 16ths of an inch) by ·035 ; the product will be the weight in tons. Thus, in the case of a ¾-inch chain ¾=12-16ths, and 12 x 12=144 ; then 144 x ·035 =5·04, say 5 tons—the safe working strain. If the squares are divided by 28, a similar result is obtained. Thus, 144 divided by 28=5·14.

Example.—½ in. chain (8-16) = 8 x 8 = 64 x ·035 = 2·24 tons which is the safe working strain of a half-inch chain.

EXTRA FLEXIBLE STEEL WIRE CRANE ROPE.
(Bullivants' Brand.)

Size Circumference. in.	Construction.	Weight per Fathom. lbs.	Guaranteed Breaking Strain. tons.	Diameter of barrel or sheave. in.	Price Galvanised. per cwt.
7	6 x 37	48	154	42	
6	,,	35	113	36	
5	,,	24	79	30	60/–
4½	,,	19	63	27	
4	,,	15½	51	24	
3½	,,	11¾	38	21	65/–
3½	6 x 24	11½	35	21	
3¼	,,	9½	30	18	57/–
3	,,	8	25	16½	
2¾	,,	6¾	21	15	58/–
2½	,,	5¾	18	13½	61/–
2¼	,,	4¾	14½	12	64/–
2	,,	3½	11¾	10½	67/–
1¾	,,	2¾	8¾	9	72/–
1½	,,	2¼	6½	7½	80/–
1¼	,,	1½	4¼	5	105/–
1	,,	1	3	4	122/–
		per 100ft.	lbs.		
¾		7½	3400	3½	2/– lb.

HEMP AND WIRE ROPES, COMPARATIVE STRENGTH, &c

Hemp Rope		Wire Rope of Equal Strength.			
Girt in inches.	Lbs weight p. fathom.	Girt in inches.	Lbs weight p. fathom	Breaking strain, tons	Working load, cwt.
2¾	2	1	1	2	6
3¾	4	1⅝	2	4	12
4½	5	1⅞	3	6	18
5½	7	2⅛	4	8	24
6	9	2⅜	5	10	30
6½	10	2⅝	6	12	36
7	12	2⅞	7	14	42
7½	14	3⅛	8	16	48
8	16	3⅜	9	18	54
8½	18	3½	10	20	60
9½	22	3¾	12	24	72
10	26	4	14	28	84
11	30	4⅜	16	32	96

Chains for Crab Winches, price per cwt.—

Thickness of iron in link ¼-inch diam. £1 15 0

,, ,, ⅝ ,, ... 1 5 0

BLACK PLOUGH STEEL WIRE ROPE.

6 x 37—2½in., 70/– ; 3½in., 65/– ; 4in., 60/–.
Intermediate sizes in proportion.

SELF SUSTAINING WIRE ROPE LIFTING BLOCKS.

1½ ton.	2 tons.	5 tons.
£8/10/–	£10/10/–	£15

For manufacturer, *see* advt., page 17.

WIRE ROPE SHEAVE PULLEY BLOCKS.

Size. in.		Tested. tons.	To take rope. in. cir.	Price, each.
8	Single, with Eye	8	1½	£3 0 0
10	,, ,, ...	8	2	3 15 0
12	,, ,, ...	8½	2¼	4 0 0
14	,, ,, ...	12	2½	6 0 0
16	,, ,, ...	16	2¾	10 10 0
10	Double ,, ...	14	2	6 0 0
12	,, ,, ...	17	2¼	7 10 0
14	,, ,, ...	20	2½	9 10 0
16	,, ,, ...	38	2¾	17 10 0
10	Treble with Shackle ..	18	2	8 10 0
12	,, ,, ..	23	2¼	10 0 0
14	,, ,, ..	35	2½	14 0 0
16	,, ,, ..	50	2¾	15 0 0
16	Fourfold ,, ..	55	2¾	20 0 0

See makers' agents, advt., pages 17 and Scrutton & Co., outside cover

Prices of Hemp Rope.

Best Manilla Rope.—By the coil, ½in., 80/– ; ¾in. and up, 91/– per cwt. Cut, ½in., 9d. ; ¾in. and up, 8d. per lb.

N. Z. Flax Rope.—By the coil, ½in., 75/– ; ¾in. and up, 69/– per cwt. Cut, ½in., 9d. ; ¾in. and up, 7d. per lb.

Flax Lashing.—2-ply, in balls, 75/– per cwt. ; 8d. per lb.
3-ply, in coils, 60/– per cwt. ; 7½ per lb.

Original coils of Rope contain about 120 fathoms ; lashing about 56lbs. per coil and 7lbs. per ball.

SELF-SUSTAINING DIFFERENTIAL PULLEY BLOCKS.

(Weston's Patent, with 40ft. chain.)

To lift—	£ s. d.		s. d.
5 cwt.	1 15 0	Tested Chain, extra per foot ..	0 6
10 ,,	1 19 0	,, ,, ..	0 6
20 ,,	2 14 0	,, ,, ..	0 9
30 ,,	3 13 0	,, ,, ..	0 10
40 ,,	4 0 0	,, ,, ..	1 0
60 ,,	4 10 0	,, ,, ..	1 1

SELF-SUSTAINING PULLEY BLOCK.

(Herbert Morris and Bastert, Ltd., Empress Works, Loughborough, Leicestershire.)

Prices, with Oval-Link Chain.

To lift—tons	1	3	5	7½	10	15
Price—10ft. hook to hook	£5/5/–	£10 .	£14	£19	£25	£45
Per foot extra, hook to hook	1/6	2/–	2/6	3/6	6/–	—

TRAVELLING PULLEY-BLOCKS.

To lift—tons	1	3	5	7½	10	15
Price—10ft. joist to floor	£12	£16	£24	£35	£42	£65
Per foot extra, joist to floor	2/–	2/6	3/6	5/–	7/–	25/–

IRON BLOCKS, FOR HEMP ROPES.

Size of Sheave, inches	2½ x ⅜	3½ x ½	4 x ⅝	4¾ x ¾
Single Sheave Block	4/–	5/–	6/–	8/–
Double	5/6	7/6	9/–	12/–
Treble ,,	7/6	9/6	12/–	14/–
Snatch ,,	—	—	6/–	7/–

Size of Sheave, inches	5 x ⅞	6 x 1	7 x 1¼	8 x 1½
Single Sheave Block	10/–	11/–	13/–	16/–
Double ,,	13/–	15/–	22/–	30/–
Treble ,,	17/–	20/–	29/–	38/–
Snatch ,,	10/–	12/–	14/–	18/6

Extra Wheels or Sheaves for Single, Double, or Treble—

Blocks, inches	2½	3½	4	4¾	5	6	7	8
	6d.	7d.	8d.	1/2	1/9	2/6	3/9	5/–

GIN BLOCKS.

Size of Sheave	6 x 1	8 x 1	10 x 1	12 x 1	14 x 1¼
Price	7/–	8/–	10/–	12/–	13/–
Size of Sheave, inches	16 x 1½		18 x 1½		20 x 1½
Price, each	16/–		18/–		19/–

BURR SAFETY LIFT (Automatic).

12-stone man can lift 1000lbs. dead weight.

A Self-sustaining Pulley.

		Weight.	Capacity.	Price.
No. 3	For ⅜-inch Hemp rope	4½lb.	300lbs.	£0 12 0
No. 4	,, ½-inch ,,	6½lbs.	350lbs.	1 0 0
No. 5	,, ⅝-inch ,,	11lbs.	400lbs.	1 5 0
No. 6	,, ¾-inch ,,	17lbs.	450lbs.	1 10 0
No. 4½	,, ½-inch ,,	10lbs.	600lbs.	1 15 0
No. 5½	,, ⅝-inch ,,	20lbs.	700lbs.	2 2 0
No. 6½	,, ¾-inch ,,	28lbs.	850lbs.	2 10 0

The above prices and weights include Blocks only. No Rope.

Circular Pit or Building Crane, to swing complete circle, to raise 2 tons, may be made with a 5-ton crab winch, crane post (hardwood 35ft. by 9in. sq.), Oregon jib, 25ft. by 9in. by 6in., with iron sheaves or wheels let into crane post and jib, ½in. chain, four 1⅛in. girt galv. wire rope guides, each 66ft. long, also 20 fathoms 2½in. girt best steel flexible wire rope, iron fittings, labour, &c., complete at a cost of about £45.

WOOD STAVE PIPE.

(Extracts from above Company's Catalogue.)

CONSTRUCTION.

"Pioneer" Machine Banded Wood Pipe is constructed of staves of Oregon timber accurately dressed both sides, and bound with No. 4 gauge galvanised steel wire, covered with a heavy coating of bituminous composition, and wrapped with saturated Hessian cloth. The pipe is then rolled in sawdust.

The pipe is made into convenient lengths, from 8ft. to 16ft. long, with butt joints enclosed in a "sleeve" or joint coupling.

The wire is wound round the pipe under heavy tension by machinery.

The pipe is also constructed in **continuous staves on site** for the larger sizes, or according to special specification and design. For instance, wood pipe with thicker staves at bottom are constructed for sewerage or hydraulic sluicing up to 450 ft. pressure or **head of water.**

Memorandum.

Where the pipe can be maintained full the conditions are favourable to resist white ants, dry rot, and splitting through shrinkage, and its life generally is prolonged.

Electrolysis and the action of acids and mineral fumes have no effect on wood pipe, which are special features in its favour.

Oregon Pine is one of the resinous, soft, straight grained woods that is found suitable for pipe building.

Life Records of Different Wood Pipes.

In 1829 a line of 3in. bored wood pipe, 2 miles long, was laid at Fayettville, U.S.A., and is still in use.

Oak wood water pipes taken up in London not long ago, after having been in the ground two centuries, were excellently preserved.

Old bored Ironbark and Turpentine wood pipe was recently dug up from streets in Sydney, N.S.W., and was found to be in a good state of preservation after being underground for 70 years.

The large Oregon wood stave pipe which carries the water which supplies the pumps of the City Water Works of Manchester, N.H., U.S.A., was laid in 1874, and the superintendent of the works recently said: "We know nothing of its condition, as it was laid 6ft. below surface, and we have had no occasion to disturb it."

Cost of Installing System.

The following list of lengths of **systems installed** with their comparative approximate **costs** have been copied for your perusal:—

The first line installed by the Metropolitan Board of Water Supply was a 4½ mile line of 8in. pipe, which was laid in 1909 for carrying the main water supply to the town of Camden, N.S.W., at a cost of £2900 installed complete; the approximate cost of cast iron pipe, same diameter, would be about £6000.

Narrabeen Water Supply.—4 miles of 6in. 25 ft. pressure pipe, laid in prepared trenches—estimate, £2400.

New Norfolk (Tasmania) Water Supply.—5½ miles 8in. pipes to withstand pressure 220lbs. per sq. inch. Most of the main is under ground, but it passes uncovered over a dozen bridges, and across the River Lachlan on suspended cables affixed to a cradle.

Mt. Cameron Water Race (Tasmania).—3000ft. of 30in. wood stave laid in 1911 as a syphon, laid on bearers in a shallow trench protected with earth covering throughout—price, £1602 ; comparative tender price for above work in steel pipe, ⅛in. thick, £3000.

Comparative prices W. & S. Board, N.S.W.—Average cost of 8in. supply mains per mile : Cast iron, £1583 ; steel, ⅛in. thick, £1188 ; wood, £836.

(Extract from report by Mr. S. McIntosh, Director of Irrigation.)

"At Denver City, Colorado, wood pipes have been in use for 28 years, and, although I could not get any very decided information, they seemed to have given general satisfaction. After reaching the Californian side I heard of them at Los Angeles through Mr. George Chaffey, who used to be in Australia. The day I arrived he told me he had just been shown a pipe taken out at Etiwanda, which he had seen laid 28 years ago, and which was found to be in a perfect state of preservation. Mr. Chaffey was so satisfied with it that he said he had closed with a firm for a supply of 4 miles of pipes, with a further length to follow if satisfactory."

From all the information we have been able to gather, both for wood pipes and against them, we have come to the conclusion that their efficiency in Australia up to date has been proved to be satisfactory. Whether it is advisable to use wood pipes for very high pressures is a matter for engineers ; the Wood Pipe Company will guarantee their pipes to stand pressure of 350ft. head.

Appoximate Weights of Wood Pipe in lbs. per foot—

	Pressure Head in Feet.				
Inside diam.	25ft.	50ft.	100ft.	150ft.	200ft.
in.	lbs.	lbs.	lbs.	lbs.	lbs.
3	4½	5	5	5½	5½
4	5½	6½	6½	7	7
5	8	9	9½	9½	10
6	9	9½	10	10½	11
8	10½	12½	12½	13	13½
10	14½	16	17	18	18½
12	16½	17	17½	19	20
14	19	20	21	22	23
16	24	27	28	29	30
18	26	29	30	32	36
20	34	39	43	44	47
22	38	45	48	51	54
24	40	47	49	53	56

Example only—12,000ft. of 9in. pipes at Y Water Tin Co., Emmaville, N.S.W., per manager A.H.P. Moline report, cost one halfpenny per foot run.

BANDED WOOD PIPE (HESSIAN COVERED).

Prices per foot, f.o.b., for Sydney, etc.
(Subject to fluctuations.)

Pressure Head in Feet.

Inside Diam. in.	25ft. s. d.	50ft. s. d.	100ft. s. d.	150ft. s. d.	200ft. s. d.	Prices up to per ft, on application.
3 & 4	Prices up to 450 pressure head on application.					
5	1 5¾	1 7	1 8¼	1 8¾	1 9¼	450
6	1 9½	2 0¾	2 1¾	2 2½	2 3¾	450
8	2 4	2 7¼	2 9	2 9¾	2 10½	400
10	3 1¼	3 5¼	3 5¾	3 7¾	3 10	400
12	3 7½	4 1¼	4 3¼	4 7¼	4 10½	350
14	4 2¾	4 11¼	5 3½	5 6	5 8¾	350
16	5 4¾	5 11¼	6 4½	6 7¼	7 1¼	350
18	6 4	6 9	7 1¼	7 5¾	7 10½	350
20	7 8¼	8 1½	8 9½	9 3¾	9 9½	300
22	8 5¾	8 11¾	9 5	9 10½	10 4	300
24	9 4½	9 11	10 6½	11 2¼	11 7¾	300

WITHOUT HESSIAN COVERING.

3 & 4	Prices up to 450 pressure head on application.					
5	1 4¼	1 5½	1 6¾	1 7¼	1 7¾	450
6	1 7¾	1 11	2 0	2 0¾	2 2	450
8	2 2	2 5¼	2 7	2 7¾	2 8½	400
10	2 10¾	3 2¾	3 3¼	3 5¼	3 7½	400
12	3 4½	3 10½	4 0½	4 4½	4 7¾	350
14	3 11½	4 8	5 0	5 2¾	5 5½	350
16	5 1	5 7½	6 0¾	6 3½	6 9½	350
18	6 0	6 5	6 9¼	7 1¾	7 6¼	350
20	7 3¼	7 9	8 5	8 11¼	9 5	300
22	8 0¾	8 6¾	9 0	9 5½	9 11	300
24	8 11¼	9 5¾	10 1¼	10 9	11 2½	300

Special quotations given for quantities (¼ mile or over).
(*See* advt., page 8.)

Labour Required in Laying Wood Pipe.

Probable cost of installing (straight lines) of Piping per Company's catalogue in 9 working hours. Wages at 9/– per day.

Men.	ft.	in. dia.	Approx. cost per 100ft. s. d.	Men.	ft.	in. dia.	Approx. cost per 100ft. s. d.
4	2000	3	2 0	6	1000	14	6 0
4	2000	4	2 0	6	800	16	7 6
4	1800	6	2 2	6	600	18	10 0
4	1500	8	2 7	6	500	20	12 0
5	1400	10	3 7	6	450	22	13 6
6	1200	12	5 0	6	400	24	15 6

Cost of excavation, supports or staying, functions and fittings to be added.

Approximate Ocean Freights Cost per foot on Wood Pipe from Sydney—

Number of feet run per ton shipping of 40ft.

Dia. of pipe ..	3in.	4in.	5in.	6in.	8in.	10in.	12in.
Feet per ton ..	147	103	84	64	43	30	23
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Adelaide ..	0 1 0	1½ 0	1¾ 0	2⅓ 0	3½ 0	5 0	6½
Brisbane ..	0 0¾ 0	1 0	1⅕ 0	1⅗ 0	2⅖ 0	3⅖ 0	4⅖
Fremantle ..	0 1¾ 0	2½ 0	3 0	4 0	6 0	8⅖ 0	11

Dia. of pipe ..	14in.	16in.	18in.	20in.	22in.	24in.
Feet per ton ..	18	15	12*f* 4	10*f* 4	9	7*f* 6
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Adelaide ..	0 8⅕	0 9⅘	0 11⅘	1 2⅛	1 4½	1 7⅓
Brisbane ..	0 5⅔	0 6¾	0 8⅕	0 9⅘	0 11⅓	1 1⅖
Fremantle ..	1 2	1 4⅘	1 8⅓	2 0⅕	2 4	2 9⅙

RAILWAY RATES.

N.S.W. ..	B Class for 5 ton lots 1st Class for smaller quantities.
Victoria ..	B Class for 1 ton lots C Class for smaller quantities.
Queensland ..	B Class for 2 ton lots 1st Class for smaller quantities.
South Australia	B Class for 4 ton lots C Class for smaller quantities.
West. Australia	B Class for 5 ton lots C Class in 1 ton lots. 1st Class for smaller quantities.
Tasmania ..	Class 1 for 2 ton lots and upwards. Less than 2 ton lots, Class 2.

MUNICIPAL PIPES.

REINFORCED CONCRETE PRESSURE AND SEWER PIPES

PRESSURE PIPES.

In 6 or 8ft. lengths.

	s. d.		s. d.
4in., per foot	0 10	15in., per foot ..	5 0
6in. ,, ...	1 6	18in ,, ..	6 0
9in. ,, ...	2 0	24in. ,, ..	8 0
10in. ,, ...	2 6	30in. ,, ..	12 0
12in. ,, ...	4 0	36in. ,, ..	16 0

SEWER AND CULVERT PIPES.

In 6ft. lengths.

	s. d.		s. d.
4in., per foot	0 8	15in., per foot ..	3 2
6in. ,, ...	0 11	18in. ,, ..	3 7
9in. ,, ...	1 4	24in. ,, ..	6 3
10in. ,, ...	1 9	30in. ,, ..	8 6
12in. ,, ...	2 6	36in. ,, ..	10 0

Hume Bros. Cement Iron Co., Ltd. Head Office: 121 Flinders-street, Adelaide.

Special quotations on application, *see* advt., page 45.

ROADS AND STREETS.

ROAD MAKING.

Extracts from "Road Making," by Duncan Salmon, M.I.C.E.

Macadamised roads require first of all a solid and drained foundation, and a surface rolled as soon as the broken metal is laid to uniform grades and slopes.

Rolling before traffic regulates the life of a road, as witness the quality of Melbourne and Brisbane roads where the above is the practice.

Top layers, 6 to 9in. thick of broken metal to a 2½in. gauge, with a good cementing material, or blinding of blue metal screening, or ironstone or clay, to keep the water from percolating, and softening the under structure.

Tarred metal roads and paths last longest. Ironstone Ridge Gravel found throughout the Australian States contains clayey or other cementitious properties that bind well under pressure of traffic or otherwise. Note the comparatively little effect through heavy traffic of wool teams with narrow tyred wheels following the one track across these red ridges year after year, thus proving that foundation and drainage are the principal requirements of a good road.

For road construction, basalt or bluestone comes first with granite, quartz, schist, white metal, limestone and sandstone, hard quartz with ironstone bands, following in the order named.

The quarried basalt is preferable to river or creek gravel ballast, as it binds together better, having no smooth water worn surfaces to slip under pressure.

Compressed Asphalt for Road Making.

Asphalt is a natural rock without any admixture whatsoever. This asphalt rock is mined in a similar manner to coal, and when taken out of the mine it is crushed to powder and despatched in this form to Australia and elsewhere. This powdered asphalt is heated in properly constructed furnaces and laid upon a concrete bed, and rolled with heated roller, rammed, and smoothed with hot tools until it is practically compressed back again into its rock form, only with a flat surface. It is essential for the success of a pavement that the rock should be specially selected containing the right percentage of bitumen to suit the conditions of climate. These roadways vary in price according to local conditions, but according to recent tenders, the Compressed Asphalt Roadway is said to be about the same as woodblocking, viz., 13/6 per sq. yard, or 23/– per sq. yard including concrete about 8in. thick ; 6d. per year extra for maintenance of the asphalt. For special quotations *see* Neuchatel Asphalt Co.'s page advt. 12.

Val de Travers asphalt, 1in. thick, from 9/– to 10/– per sq. yard, Limmer and Val de Travers Asphalt for quotations, quantities. *see* Asphaltum Co., advt., page 4.

STREET PAVING, etc.

A perfect street paving must be sanitary, durable and economical, with a smooth and well-graded surface. **Compressed** rock asphalt lays claim to all these attributes.

It is sanitary and clean, as it produces no dust, therefore no mud, and as it is laid from kerb to kerb without joints, no water or filth can percolate through to foundations. A shower of rain washes the surface only, which dries again within fifteen minutes.

The Neuchatel Asphalt Roadway Co. laid Cheapside, London in 1870, was not relaid until 18 years later, and there are instances in London, Paris and Berlin where asphalt roadways have lasted for 30 years.

The cost is from 10/6 per sq. yard for 1in. thick. The cost of foundation for above must be added according to requirements. *See* pages 4 and Neuchatel Asphalt, No. 12, advt.

TARRED METAL ROAD.

Not including Foundation.

	£	s.	d.
4½in. thick, graded and rolled and sanded—			
3 cubic ft. of bluestone metal, broken to a 2½in. gauge, mixed with 1 gal. of hot tar, 3in. thick ; ¾ in. tarred metal, 1in. thick ; tarred screenings, ½in., price per sup. yard	0	3	0
3in. thick, in two courses, per super. yard	0	2	0
Top dressing, 1in. thick, rolled and sanded	0	1	0
Top dressing, ½in. thick, rolled and sanded	0	0	9
Painted with hot tar and screenings	0	0	3
Concrete foundation to above	0	6	0

Excavation and Grading to be added.

Cost of Top Dressing—

(Extracts from L.G. Engineer, S. Gordon Moore, Bendigo, Victoria.)

Municipal Road Gang.

Tarring Gang—viz., 2 sweepers, 1 dust cart and driver, 1 tar cart and driver, 3 sand carts and drivers.

Day's Work for Plant, 1200 sq. yards of road—Clean, tar and sand, using 600 gals. tar to 20 cub. yards, 27 loads sand.

5 chains of roadway, ½ chain wide, per day cost about 4¾d. per sq. yard, or £1/12/– per 22 yards x 11 yards—242 sq. yards, or 1 chain by ½ chain wide. £3 per chain and 1 chain wide.

Near city, Prahran, Melbourne, cost 2½d. to 4d. per sq. yard.

Fitzroy, Vic., cost 3d. per sq. yard.

Perth W.A., tar from Melbourne, at 7d. per gal.

Sand costs 13/– per cub. yard.

Comparative Cost of Maintenance without and with Tar—

Re-metalling road, 1/3 per sq. yard.
Watering road, 4 years, at 7½d. per year.
Tar grouting—1st year, 5d.; 2nd, 3rd and 4th year, each 3/9d.
Saving—5d. per yard on re-metalled road.

WOOD PAVEMENT.

"**Wood-blocking** is one of the permanent methods for road paving where the conditions and the prevailing local circumstances permit."

Notes from the City Surveyor of Sydney, June 3rd, 1914.

The best timbers for this purpose are Tallowwood, Blackbutt, Blue Gum, Red Gum, and Mahogany.

These are laid with a depth of 5in., the blocks being cut 9in. x 5in. x 3in., 8in. x 5in. x 3in., and 7in. x 5in. x 3in.

The modern practice is to lay the blocks with close joints—50 blocks cover a square yard.

The life of the pavement is about 16 years.

In the city streets the blocks are laid up on 6in. of concrete.

The total cost, including excavation, concreting, wood paving, and top dressing with tar and pea gravel is about 22/6 per square yard in Sydney—i.e., by contract for a fair area.

The cost of maintenance is practically nil for the first 10 years, after which a small sum is required annually for repairs.

The cost of top dressing the blocks with distilled tar and pea gravel is about 3d. per square yard, the dressing having a life of about 6 months.

It has been known for the past 40 years that it is not suitable for inclines over 1 in 20.

	£	s.	d.
Removing old metal, &c., from one-half of street to a depth of about 18in. (ballast 9in., metal 9in.), and keeping site in repair during wood paving of other half, per cubic yard ..	0	4	0
Concrete, viz., 24 cubic feet of river gravel (not larger than 2½in. gauge) and coarse clean river sand to one cask of cement, per cubic yard	2	0	0
Rendering up to ½in. thick, with one-third of cement to two-thirds of clean, sharp river sand, per super yard ..	0	2	0
Woodblocks—20 per cent. 7in., 20 per cent. 8in., and 60 per cent 9in. (by 5in. x 3in.), dipped in hot tar, laid with butt joints and top dressed with well-boiled tar, river sand, and small gravel, per super yard	0	12	6
Bluestone or Trachyte cube-setts, 6in. to 8in. x 7½in. to 14in. x 4in., laid with close joints on 2in. clean, sharp river sand and well flushed up by sweeping with sand, per sup. yard	0	15	0

TAR DRESSING ROADS.

Hot sprayed tar with sand, 1 gal. covers 4 sq. yards on new roads, 9 sq. yards on old roads.

COST OF KERBS AND GUTTERS—VARIOUS.

Brisbane streets have adopted the Hardwood kerb and concrete gutter, owing to the cost of working the local stones.

Superior Concrete Gutters are replacing the use of stone gutters in many localities.

	£	s.	d.
12 x 6 **Hardwood Kerbs**, chamfered on edge, bolted to uprights, 4in. x 3in. x 30in. long, spaced 6ft. apart and coated with hot coal tar ; White Metal Concrete Gutter, 2ft. wide by 6in., slightly dished in centre, per run yard	0	5	0
14 x 7 **Sandstone Kerb**, chamfered top edge, concrete gutter, 20in. x 7in., dished 1½in., per yard run	0	7	0
Ditto, with guttering, 24in. x 6in., two stones laid in sand and grouted with cement	0	9	0
Ditto, with gutter, one stone	0	10	0
18 x 10, **Sandstone Kerb**, long stones, 24in. x 9in. gutter, two stones for first-class work	0	11	0
Ditto in one stone	0	12	0
18 x 7 **Bluestone Kerb Gutter**, two stones, 12in. x 8in., dressed and tool chamfered edge, per yard	1	7	0

CONCRETE KERBS AND GUTTERS.

	s.	d.
Reinforced Concrete Kerbing—		
12in. x 6in., in 5 ft. lengths, per foot run	1	9
Reinforced Gutter Crossings—		
12in. x 6in. x 3ft. 8in. long, per foot run	2	0
15in. x 9in. x 3ft. 8in. long, per foot run	3	0
Reinforced Troughing—		
22½in. dia. x 14½in. deep x 4ft. 6in. long, per foot run	2	9

Extra for ends, 5/– each ; standards, 10/– each ; plugs, 2/6 each.

REINFORCED CONCRETE FLAT PLATES.

For Pavings, Manhole Covers, Gutter Crossing Slabs.

	Weight.			Per sq. ft.	
	cwt.	qrs.	lbs.	s.	d.
1¼ in. thick	1	0	14	0	9
1½in. ,, ...	1	1	13	0	10
2 in. ,, ...	1	3	2	1	0
2½in. ,, ...	2	1	0	1	3
3 in. ,, ...	3	2	13	1	6

Inverts. - According to section and strength, 3ft. to 6ft., from 5d. per lin. foot. *See* page 45.

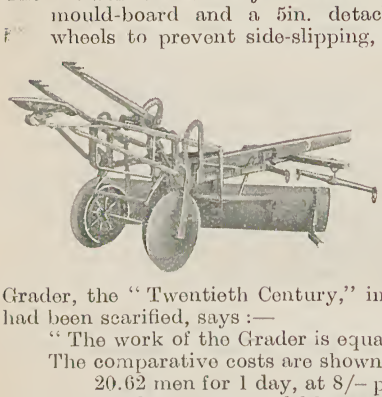
MUNICIPAL PIPES.

Asphalt Pipes advt., page 4.
Reinforced Cement Pipes, pages
Gas and Water, with Iron and Gal. Iron Pipes, pages 246, 247.
Glazed Earthenware Pipes, Drainer, page 108.
Steel Riveted Pipes, page 167.
Sanitary and Malleable Cast, pages 249, 250 to 253.
Cast Iron Pipes, pages 187, 188.
Steel Casing for Artesian Wells (*Artesian Section*).

ROAD GRADERS.

Road Graders are made in sizes for two or four horses abreast, and can grade a road to any desired contour, or throw the soil either way. Two men required to work machine. The blade can be set at any pitch and at any angle, or made to work close up to footpaths and boundaries. The Grader is also employed for making tracks, cutting drains, grading irrigation paddocks, making shallow storm-water channels, irrigating and draining on any extensive scale. Probable saving of cost from 30 to 50 per cent. in road grading on old methods employed. These machines are sometimes fitted with flanged skids for traversing rough country where wheels would be too quick. *(See Machinery Agents' advts.)*

The "Twentieth Century" Grader is made with a 6 ft. reversible mould-board and a 5in. detachable cutting blade, 2 flanged wheels to prevent side-slipping, with axle 3ft. long, and weighs about 6 cwt.



Machine for 1 man and 2 to 4 horses, price, f.o.b., £60.

H. W. Statham, Esq., Shire Engineer for Wollondilly Shire, The Oaks N.S.W., in an official report, dated 9th December, 1912, after giving certain particulars of work done by a comparative light Grader, the "Twentieth Century," in re-forming a metalled road that had been scarified, says :—

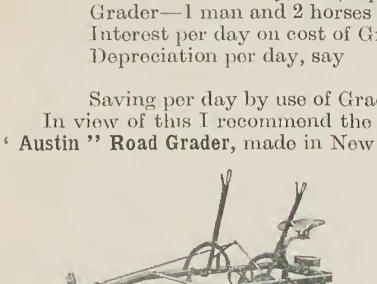
"The work of the Grader is equal to that of 20 men.

The comparative costs are shown below :—

20.62 men for 1 day, at 8/- per day			£8	4 11
Grader—1 man and 2 horses for 1 day	£0	16 0		
Interest per day on cost of Grader ..	0	0 1		
Depreciation per day, say	0	2 6		
Saving per day by use of Grader			£7	6 4

In view of this I recommend the purchase of a second Grader."

'Austin" Road Grader, made in New Zealand, costs from £80 to £100.



Reversible and Double Edged.

The "Glide" Road Machine, for light grading work and drain excavation.

Dimensions—8ft long x 3ft wide, on 4 flanged wheels to prevent skidding, and blade 5ft long x 12in. wide, operated by 1 man and 2 horses.

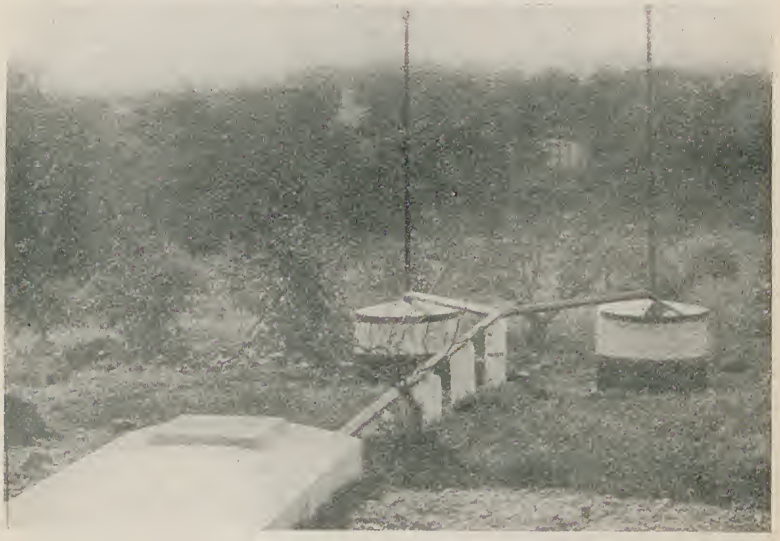
Price £35
(f.o.r. or f.o.b.)

SEPTIC TANKS.

There are many different systems dealing with the above matter, varying not only in detail of construction, but claiming more or less efficiency as regard results and other advantages in price or compactness.

I append the following extracts from two different writers of these systems :—

BIOLOGICAL TREATMENT OF SEWAGE UNDER THE "EXCELSIOR" SYSTEM.



This system commences with a screening chamber constructed at the inflow end of the tank, so as to form a vortex with the inflowing liquor and carry the sewage, together with the inorganic matter in suspension across the face of the screen.

This action thoroughly breaks down the sewage into a weak state, and it then passes through specially arranged intake pipes to the body of the septic tank.

The tank is designed air-tight, with a specific ratio of length to breadth and to depth, having a fall towards the intake.

The proportioning of these tanks, for both small and specially large installations, is of the utmost importance and must be adapted to the local Australian conditions of climate and the nature of the effluent from various classes of sewage.

Inside the tanks are fittings arranged to control the scum, which is formed upon the surface of the liquor in the tank by the bacteria, and which is of the utmost importance to the efficient working of the system. The bacteria utilised is that known as *Bacilli Coli Communis*, together with another specie known as *liquifaciens*. This scum formation has a twofold purpose. First, it is used by the bacilli to hermetically seal up the inside of the tank, as oxygen is fatal to their existence. Secondly, it forms the culture upon which the colonies thrive. It is therefore of the utmost importance in the design that no part of the tank should interrupt the unbroken formation of this scum, and that no inrush or outflow should cause an agitation or crack of the scum.

After the sewage, in a broken state, passes into the tank, large numbers of the *colonies* in a very rapid progress pass from the scum down through the liquor and immediately break up all the organic compounds, reducing them to their original elements, and the colonies then return to the scum.

The liquor which passes from the tank is then quite clear, but contains cellulous and other putrefactive substances, such as albuminoids in solution.

It is then necessary to further treat the primary effluent. It is done in special patent bacteria beds, consisting of distributors and a carefully selected pebble media, and the quantity of the effluent per cubic yard of filter media is arrived at.

After the bacteria beds have been working for a short period there is formed on the surface of each pebble forming the media a coating of slimy growth. When this is removed and dried it forms a stiff jelly, in which, when cut with a knife and placed under the microscope, masses of bacteria are found to be present. If placed in a tube containing air this jelly will rapidly absorb all the oxygen. It is this function that is used in the bacteria beds to procure the excellent effluent which is obtained, and the bacteria which you observe from the above, while they are the same species as cultured in the tank, thrive in the presence of oxygen in a different state, viz., *Aerobic*. As the effluent from the tank passes over the jelly growth on the stones, the putrefactive substances held in solution are subtracted, and the water left entirely free from any matter that will prove putrefactive even under incubation at a high temperature for long periods.

The result is that an effluent is produced in which gold and silver fish are said to thrive without showing any sluggishness in their movements. This is admitted to be the highest scientific test any effluent could be submitted to.

Sewage Tank and Bacteria Bed installed complete.

No.	Persons.	£	s.	d.	No.	Persons.	£	s.	d.
1	3	42	16	11	5	30	82	3	6
2	7	49	5	8	6	40	92	1	1
3	10	54	18	2	7	50	122	18	3
4	20	73	1	6	8	100	206	16	7

The above prices are subject to the following conditions :—

That the distance between the tank and bacteria bed in order to get 6ft. fall do not exceed 20ft., if this is exceeded 3/6 per lineal foot extra is to be charged. No sewer work included.

For further information on above system *see* advt., page 3.

By "Monier" Concrete Co. System.

Or Process of Biological Purification.

The most modern, efficient and inexpensive method of the disposal of sewage is the biological treatment of same—that is, the purification by means of the anaerobic and aerobic micro-organisms respectively contained therein and subsisting thereon. As their names imply, the living conditions of these organisms are different.

The *anaerobic organisms*, to thrive and multiply, require a liquid shut off from light and air, a condition which is provided by a septic tank.

The *aerobic organisms*, on the other hand, require plenty of air, and a construction creating the most favourable conditions for their existence, at the same time enabling the liquid to be aerated, is called an Aerator.

Now the biological treatment consists in the passing of the sewage through the *Septic Tank and Aerator* so that their respective cultures of the micro-organisms may come into contact with and subject the sewage to the process of purification. This purification becomes the more intensified the greater and healthier these cultures of the micro-organisms, and every installation requires at its inception some period for development of these before the best results may be expected.

Of the two separate treatments, the first, or passing the sewage through a septic tank, is always essential as, thereby, the suspended matter in the sewage is broken up and assimilated by the anaerobic micro-organisms and the objectionable liquid transformed into one slightly discoloured, inoffensive and of sufficient purity to be run into tidal waters or used for irrigation purposes. If the effluent is to be discharged close to human habitation or likely to drain into water-courses, it is necessary to pass the effluent from the septic tank through an aerator to be aerated and brought into contact with the aerobic micro-organisms for further purification.

General Points.

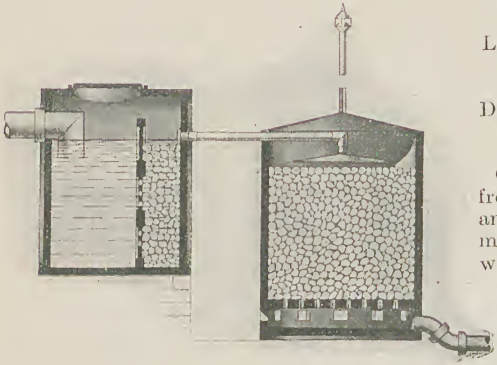
In all cases of septic installations the most suitable position compatible with local conditions must be selected to enable the discharge of the effluent. If the ground has a slope the installation should be arranged so as to discharge the effluent at the surface of the ground, where it may run into surface drains to soak into the soil or be used for irrigation purposes. If the ground be flat, the installation must necessarily be underground and the effluent must be discharged into underground drains of rubble or perforated pipes to soak into the sub-soil or to be collected into a tank if required for irrigation purposes, in which latter case the liquid will have to be lifted by mechanical means to the surface of the ground.

To ensure the proper working of the installation, the discharge of the W.C., the house and kitchen slops, bath and laundry water, should all pass through same. A too-concentrated or too-diluted sewage are all unsuitable.

Disinfectant must be strictly excluded. Only *sanitary paper* should be used in the W.C.

Regarding the size of the drain pipe leading to and from the septic tank, we would recommend 6in. drain pipes for the former and 4in. for the latter. Care must be taken that nothing passes into the drain pipes larger than is permitted by the gratings provided at the gullies, also that the latter be cleaned out periodically.

As manufactured by GUMMOW, FORREST & Co., Ltd., Concrete Steel Manufacturers, 85 Pitt-street, Sydney.



Trade Price Lists.

List prices subject to discount.

Discount on application.

Quotations include free delivery on lorry anywhere within 5 miles by road of our works, Erskinoville; also on truck Alexandria or any city wharf.

"Monier" Septic Tanks and Aerators.

Installations comprising Septic Tanks with and without Aerators.

No. of Persons.	No. of Septic Tanks.	No. of Aerators.	Price of Septic Tanks. £ s. d.	Price of Septic Tanks with Aerators. £ s. d.
4	1	1	6 0 0	16 10 0
6	1	1	7 0 0	17 10 0
8	1	1	8 0 0	18 10 0
10	1	1	9 5 0	19 15 0
16	1	2	10 5 0	31 5 0
22	1	2	12 0 0	33 0 0
29	1	2	13 15 0	34 15 0
36	1	3	16 0 0	47 10 0
48	1	3	18 10 0	50 0 0
58	2	4	27 10 0	69 10 0
72	2	6	32 0 0	95 0 0
96	2	6	37 0 0	100 0 0

SEPTIC TANKS WITH FILTER WALL.

Manufactured by RICHARD TAYLOR, Ltd., Marrickville, Sydney.

Net prices at Works, Marrickville.

No. of Persons.	Diam. of Tank. ft.	Length of Tank. ft.	Net Price. £ s. d.
5	3	4	5 10 0
10	4	4	7 0 0
15	4	8	9 10 0

(*See* Makers' advts., pages 16, 35, 45.)

ARTESIAN WELL BORING, DIAMOND AND MACHINE DRILLING.

BORING FOR WATER.

The great success attending the results of artesian well-boring (both Government and private contracts) during the last 15 years throughout Australia, and the improved methods for boring, has reduced the problem of boring in numerous districts from a speculation to a comparative certainty.

The different State Governments, particularly N.S.W. and Queensland, owing to the large expanse of **Tertiary and Cretaceous** country of recent formation, have bores sunk along the numerous stock routes, in some instances only 15 miles apart (a day's travel for stock).

Owing to the limited and uncertain rainfall, at least one-half of Australia must ultimately depend upon its water supply from artesian wells. The maps of Australia show that the N.W. portion of New South Wales, as well as the interior between the Lachlan and Darling Rivers, are destitute of rivers; this is also the case with the South West, West and interior of South Australia, and the interior of Western Australia, extending to the Great Australian Bight on the South Coast. The rainfalls of these vast areas do not find their way to the sea, but end in lakes, swamps, and underground streams, leading to immense basins with impervious beds, which only have to be tapped to bring the water to the surface, and when the water does not rise quite to the surface, it is called **sub-artesian**, and requires the installing of deep well pumps, mentioned in (*see* pumps). In many cases, salt water has to be passed through before fresh water is obtainable. This is shut off by enclosing the bore hole with iron tubes, or casing.

The more simple methods of obtaining water, at shallow depth, are the following :—

TUBE WELLS.

Norton's Abyssinian Tube Wells.—The apparatus includes 28 feet of 1½in. gal. iron pipes, with perforations, and a steel shoe at the bottom, and costs in Sydney only £10, for 2in. pipes, £13/10/- complete ; stronger and larger plants, £50 to £70. The pipe is supported by a wrought iron tripod stand, and driven by an iron monkey. In Christchurch, New Zealand, about two-thirds of the houses have 1½in. malleable iron pipes, or tube wells.

Australian Water Auger is an earth auger, and is used in the same way as a carpenter's auger, with screwed iron rods for turning. The apparatus is simple and easily worked, and costs about £250 with tools, casing and appliances to sink 200 feet if required. Sinking under favorable circumstances will progress at the rate of 2ft, per hour for a 5in. auger.

Prospecting Boring in Small River Gravel, Shoalhaven Alluvial Flats.
Hand power auger, with portable shear legs, windlass, 3½in. shell and screw-augers, 1in. x 1in. square rods.
50 trial bores, 30 to 85ft. of river wash, shifting 80 yards to each bore Labour only, cost 1/- per foot. Plant cost £65.
Boring in felsite, Burragorang, to 560 feet, with a small steam cable-boring plant, for a 6 inch diameter bore. Cost, including a second hand plant bought for £200, £1120, or £2 per foot deep.
The last two systems were used, and cost ascertained, by the author.

ARTESIAN WELLS.

The sinking of these wells or bore holes for great depths, by heavy machinery and steam power is generally commenced by boring with an auger an 11in. hole as deep as possible.

Into this bore is inserted 10in. wrought iron tube or casing, in lengths of from 4 to 18ft., with screwed ends. Inside this tube, holes are *jumped* for casings of 8, 6, and 5in. diam., as required. Each size of casing used is started from the surface, and continued as far as possible.

If the ground is very porous the whole of the casing is left in the bore at completion.

Bits.—Every kind of soil or rock met with is pulverised by jumping with edged steel bits, which are turned about 60 degrees, 6 turnings completing the circle in the manner pursued by quarrymen in *jumping holes* for blasting.

The bits "jumped" by steam, for boring are from 3 to 4 feet long. The width of the bits being adapted to the size of casing to be used.

The rock, shale, &c., is reduced with water to the consistency of cream, which is removed by mud or sand pumps, whose outer diam. are at least ½in. less than the bore of the casing, their lengths varying from 5 to 30ft., the lower ends of the sand-pumps have chisel shaped shoes of ⅝ steel, screwed on to the tube or casing, with a valve to open upwards the whole forming the **sand pump**, which by the aid of a ½in. wire rope is lowered and raised in bore.

Sinkers.—In sinking, additional weight is given to the chisel bits. by a sinker which is a cylinder of wrought iron screwed on to the bit, The sinkers are from 2¾ to 5ins. diam., and from 12 to 28 feet in length, in one or two parts.

Jars.—To prevent the jarring of tools, or when jammed to loosen them, a jar is used next to and above the sinker. It is about 5ft. long, with a sliding joint between ends, and both ends have connecting conical screws, and is an indispensable jar for all "percussions" drilling rigs.

Rimers.—As the boring or drilling proceeds, the casing is lowered to prevent the sides caving in or falling away. There are several kinds of rimers; the fork rimer is about 5ft. long, with two opening spring forks connected with a screwed shank. The lower end of forks are open to the width required, and have chisel edges to scrape or chip off the sides of the hole below the casing, to admit of the casing being lowered; in lifting the rimer, to withdraw, it the spring forks are automatically brought nearer together by pressing against the lower end of casing when entering the same.

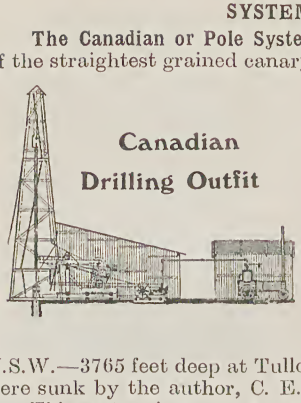
Fishing tools.—These are tools for recovering sand pumps or other tools, &c., inadvertently left in the bottom of the bore, and are of several kinds.

Rope Spear.—Is sometimes efficacious when part of the sand pump line and sand pump is left in the bore, or the drilling cable breaks.

Steel Tube and oval ring fisher to recover lost poles by passing over and catching under straps of poles by slightly turning cable.

SYSTEMS OF BORING.

The Canadian or Pole System.—Wooden rods, about 2¼ins. diam., of the straightest grained canary pine, spotted gum or yellow wood, are connected by iron pole joints with cylindrical screws of Lowmoor iron, and centre straps riveted to the wooden rods (about 18ft. long) slightly tapered at the ends to receive them. The boring string of tools, viz., bit, sinker and jar, are attached to the rods, and lowered or raised, length by length, 38ft. at a time (a very tedious method in deep bores). Some of the deepest bores have been sunk with this system; notably, two in the Moree district, N.S.W.—3765 feet deep at Tulloona, and 4086 feet deep at Dolgelly, were sunk by the author, C. E. Mayes.

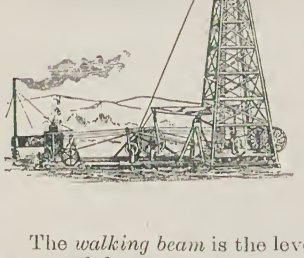


Canadian Drilling Outfit

This system is now not much used in Australia.

By a simple method of shaping and dressing the *solid bit*, it is used to *drill and underrim* for casing at the same time—thus doing away, to some extent, the double cutting of the bore hole, and the unsatisfactory working of spring under reamers.

The Cable System.—Steel wire rope for its quickness in extracting and re-lowering tools recommends itself. A driller and an engine-driver, or "wrenchman," are required for each shift, instead of three men by the pole-tool system.



The large main spool for wire rope, called a "bull" wheel, and a smaller sand spool for sand line, worked by a *friction belt* or sand-spool, and a *rope belt* on pull wheels, are brought under the control of driller by levers and brakes.

The combined system of cable and pole, using from 3 to 5 poles on top of tools, with the cable continued to the surface, and attached to the "walking beam" is sometimes used.

The *walking beam* is the lever beam 10 to 25 feet long, used to give the up and down percussion movement to the cutting tools.

Expert engineers are introducing new detail methods to suit the Australian geological strata.

Risks, Accidents and delays.—With the exception of mining, "Artesian Boring" is probably the most risky in the isolated districts of Australia.

The risk from broken tools, or the telescoping of casing, or other unforseen accidents is great, and must be allowed for in tendering.

The Poppet Head or Derrick, is a pyramidal frame erected over the proposed bore hole to support the gin wheels over which the wire ropes pass, connecting the spools or drums with the tools, boring rods, &c.

The derrick is sometimes made of Oregon pine, instead of wrought iron; the general size is 16ft. square at base by a height of 56ft., with the top 4ft. square; it is in 7 stories of 8ft. each, and should be built upon hardwood sole plates or sleepers about 10in. x 8in., the Oregon required is, approximately, as follows:—

	Sup. Ft.
4 Standards, 56ft. x 9in. x 2in., and 56ft. x 7in. x 2in., the two forming an anglewood 9in. x 9in. in seven lengths to each standard, butt jointed and fished with Oregon fish plates ..	600
28 Bearers, average 9ft. x 8in. x 2in.	336
28 Diagonals, average 13ft. x 6in. x 2in., only four diagonals to each bay, alternately reversed	364
24 Joists, 6 x 2, laid flat for flooring, fish plates, &c.	308
4 Sleepers for flooring, 18ft. x 10in. x 8in., and top bearers of hardwood	592
	2200

Large beams, obtained near site if possible, 18in. to 24in. diam., are used under floor each side of bore when hydraulic jacks are used to remove casing jambed.

	£
Estimate of complete Deep-sinking Boring Outfit.—Tools, consisting of bits, sinkers, jars, dutchmen, rimers, wrenches and levers, swivels, sand pumps, temper screw, spools, driving wheels, shaft, crank, pin and collar, iron wheels for derrick, steel casing clamps, fishers, 8ft. spud, &c., complete, about	850
Ironwork for timber derrick and rig, including bolts, angle irons, gal. steel wire ropes for sand pumps, steel wire ropes, four 400 gallon iron tanks, blacksmiths' and carpenter's outfits, engineer's requisites, belting, &c., about	130
Labor in erecting timber derrick and rig, taking down same, and cartage to Railway Station	90
Timbers for same, complete	40
Total	£1110
Overall, McCray & Co., make an iron derrick of similar dimensions, with timber foundations, for	£90
Wrought iron rig complete with belt tighteners, hust blocks, walking beam and spring pole, for	77
Engine and boiler complete (not portable), but of light pattern, with steam chest	300
Engines only (Oil Well Supply Co., Ltd.) supply motors, 10in. x 12in. stroke	110
Acme, 25 h.p. Boiler, mounted on iron carriage, £275; unmounted	260
Weight of Plant, viz., engine, boiler, rig, derrick, camp equipment, tools, &c., about 15 to 36 tons.	
Cartage to and from railway station, and transit by railway to be added, say at £5 per ton	£110

Patent Standard Cable Drilling or Boring Plant, for shallow boring or sub-artesian, to 500 feet. Frame built of angle iron, except the derrick. Equipped for depths 250, 500, and 1000ft. respectively. Weight 500ft. plant "Rig," about 3 tons 1000ft. "Rig," about 3½ tons. Mounted on 3 or 4ft. iron wheels, for transport over rough bush roads.

Standard Rig Shallow Boring.

Both **Winding drums** for raising **tools** and **sand pump** are **friction geared,** no cog gearing being used. The derrick is detachable.

A 4 h.p. Nominal Steam Engine is required.

Price, £350, without power.

For further information see manufacturers, Overall, McCray, Ltd Artesian Well Specialists and Contractors, Sydney, advt. page 50.

Cost of Machines and Boring in Alluvial Soils.

				per foot.
No. 1.	Plant with two 8in. earth augers, horse gear, &c., complete for a depth of 115ft.	£110		8/–
No. 2.	Ditto for a depth of 210 feet	130		10/–
No. 3.	do. 306 ,, ...	150		12/–
No. 4.	do. 400 ,, ...	170		14/–

If rock is met with, the necessary *drilling attachments* cost about 50 per cent. extra.

The application of the modern oil and gas engine surpasses the old methods, if the initial cost is forthcoming. See Index, PLANT, for prices

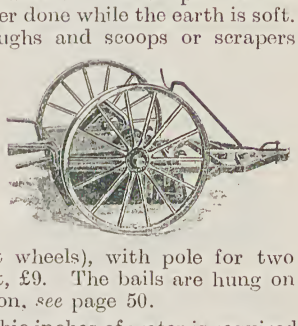
Boring with a 4in. shell auger in the bed of a dry creek to obtain water and test for well sinking, costs from 2/6 per foot to 20 feet. A tripod and horse whip being used to raise and empty auger with debris.

The Fixed Engine and Boiler has many advantages over the Portable Engine, especially when taken over bad roads. The price and weight of imported Engines and Boilers detached are less than the combination of the two, as in a portable engine. As the teamster has generally to take his waggon or dray with him for return loading, he charges for the full weight of the portable engine with its carriage and wheels, which are broad, and roll the ground on ordinary roads, but when bogged are not so easily released as narrow wheels.

When Water is reached by boring, it sometimes fails to rise to the surface. In such cases it is pumped up by deep well pumps, with brass tubes 4ft. 6in. long by 3½in. diam., having two brass valves for bottom and top, such a pump would cost about £22. As the pump rods are not liable to torsion, but only subjected to tension, ½in. galv. iron tubes are sufficient, having been used in one instance in Queensland for a depth of 1760 feet. When the water rises above the surface, it may be shut off by a valve, and supply regulated.

Leading drains are formed to direct the output of water when "struck" in boring. This is sometimes done by simply dragging the fork of a tree, the junction end first shaped pointed, or with a plow-share in front, the earth being forced out on both sides by the heavy trailing limbs following the flow of the water. This simple method often saves taking levels, and is much easier done while the earth is soft.

For permanent drains, special ploughs and scoops or scrapers are made. See pages 115, 133 and 322.



The Syracuse Scraper, on wheels, is fitted with the tray to hang high when loaded with soil for the dump.

No. 3—Capacity, 17 cub. ft. ; wheels, 46in. ; tyres, 3½in. ; weight, 875lbs.
Price, £20.

The Panama Jun. Grader, see lower block, page 392, with wheels, £18/10/–.

The Syracuse Drag Scraper (without wheels), with pole for two horses, 9 cub. ft. capacity, 150lbs. weight, £9. The bails are hung on to hooks at side. For further information, *see* page 50.

Water for Engine, etc.—About 900 cubic inches of water is required per horse-power per hour = 3¼ gallons per hour × 24 = 78 gallons per day, and 78 × 10 = 780 gallons per day of 2 = 12 hour shifts for a 10 horse-power engine.

For camping purposes, 100 gallons for waste and the use of the men in the camp, making in all 1100 gallons, or nearly five tons of water per day. As the engine is not always at work and seldom works up to its limit, the average would be about 800 gallons per day for a 10 h.p.

For larger boiler and engines, with camp allowance, up to 1500 gallons per day.

With condenser the consumption is about 50 gallons each 5 feet, good drilling.

Reservoir.—When a drought is anticipated, a reservoir can be made at least 40ft. square at bottom, and 80ft. square at top by a depth of 10ft. at water level, this will hold 37,600 cubic feet of water, and will cost from £85 to £100 with the necessary waste weir ; after going to this extra expense, there may not be sufficient rain to fill it in six months, and even if filled it would have to be watched incessantly to prevent it being stolen by quadrupeds or bipeds. The N.W. portion of New South Wales, W. of the Paroo and Darling Rivers is especially liable to drought the annual fall of rain is only 10in. per annum ; the available rainfall being very small and uncertain, so that condensers must be provided in any boring outfit to economise the water used as much as possible. The water hole should be alongside the wat course, so that the bulk and rush of flood waters would not destroy it.

Fuel required. About 10lbs. of good pit coal per horse-power per hour is required for a portable engine ; the relative steam producing power of good hardwood as compared with good coal is about one-half, therefore 20lbs. of good hardwood per horse-power per hour would be required, and for a 10 horse-power engine 200lbs. per horse or 4800lbs. for a day of 24 hours, so that at least 2 tons of firewood per day would be used while working two shifts of 12 hours each.

Heavy work will take about 10 cords of hardwood per week.

The *price* per foot of drilling Artesian Bores varies considerably according to locality and depth, so no fixed price can be stated.

A shallow Bore, lined with 6 inch casing, can be put down quicker and cheaper than a deep water well of ordinary dimensions. The *bore* being cased with steel casing, all deleterious water, sand, etc., are shut out from the supply.

Many a deep well has proved a failure by the presence of salt or mineral matter in the shallower strata passed through effecting the main supply of fresh water below.

TUBES FOR ARTESIAN BORES.

In the following table of wrought iron casing, only 10, 8, 6, 5, and 4in. diameter tubes are used for Artesian Bores in the Australian States.

SWELLED AND CRESSED JOINTED CASING.

Average Price delivered in cities.

External Diameter	4in.	5in.	6in.	6in.	8in.	10in.
Thickness of Casing	7/32	7/32	1/4	3/8	9/32	11/32
Price, per foot ..	1/10	2/2	3/-	3/4	5/-	7/8

To preserve the screws at the ends of the casing, short screwed ends are used.

TUBES FOR ARTESIAN BORES.

WEIGHT in lbs. per foot of WROUGHT IRON CASING with swelled or flush joints.

External Diameter.	Thickness in fractions of an inch									
	5/32	3/16	7/32	1/4	9/32	5/16	11/32	3/8	7/16	1/2
4 in	6·3	7·5	8·7	9·9	...	...	...	.	...	...
4½ in	7·2	8·6	9·8	11·2	12 5	13·8	...	...	...	...
5 in	..	9·6	11·1	12·6	14·1	15·5	16·9	18·4	...	...
5½ in	..	10·5	12·2	13·9	15·5	17·1	18·7	20·2	.	...
6 in	..	11·5	13·4	15·2	17 0	18·8	20·6	22·3	...	...
6½ in	..	12·5	14·5	16·5	18 5	20·4	22·3	24·3	...	...
7 in	..	13·5	15·6	17·8	20 0	22·1	24·2	26·2	30·3	...
7½ in	..	..	...	19·2	21·5	23·7	26·0	28·2	32·6	..
8 in	..	..	...	20·5	22·9	25·4	27·8	30·2	35·0	...
8½ in	..	..	.	21·8	24·4	27·0	29·6	32·2	37·5	..
9 in	..	..	...	23·1	25·9	28·7	31·4	34·2	39·6	44·9
10 in	..	..	...	25·8	28·9	32·0	35·1	38·1	44·2	50·2
11 in	..	..	...	28·4	31·8	35·3	38·7	42·1	48·8	55·5
12 in	..	..	...	31·1	34·8	38·6	42·3	45·0	53·4	60·7

N.B.—All wrought iron pipes with swelled and crested joints are made to the above and other external diameters, and when used for casing the bore refers to the *earth bore* to be cased.

See advt., page 50–53.

DIAMOND DRILLING.

Notes by James E. Elliott, of The Goldfields Diamond Drilling Co., Ltd.

During the past years the silver and lead mines at Broken Hill have done considerable diamond drilling. Some have used an electric drill—power being carried from surface over cables hung in the shaft connected with the drill below.

Bore holes have been used to assist in the drainage and ventilation of mines, and for rope-ways for haulage purposes.

The drill is capable of boring to 1 mile in depth vertical, 1200 feet in length horizontal, and 1500ft. dipped at an angle of 45 deg. Holes may be drilled vertical up or down, and at any intermediate angle, from any point in the mine workings underground, or from surface and in any direction.

The deflection of bore holes has been almost entirely overcome by recent improvements in the tools and methods used. Bore holes to 300ft. in length horizontally have been drilled quite straight, so that a lighted candle could be seen from one end to the other.

The "Clinostat" is an instrument used to show deviation of bore, and is composed of a glass tube in which is poised a plummet and magnetic needle immersed in transparent liquid gelatine. It is fitted in a brass tube and lowered to any desired point in the bore hole, the gelatine being then solidified by the use of cold water in contact with the glass tube. Before withdrawing the Clinostat, the plummet will have assumed the vertical, and the needle the meridian; given these two points as a basis, for calculating, deflection.

By the use of the "Dip Indicator," the direction of dip of strata, reef or lode may be ascertained.

A drill for 1000ft. weighs 18 cwt., and occupies a floor pace of 3ft. 6in. x 6ft. 6in.

For underground boring no derrick is required, a recess in line of borehole, 14ft., is required to work the boring tools.

For **surface boring** to a depth of 2000ft., a tripod derrick is used, 32 feet high. For a greater depth a higher derrick is used, for the 20ft. rods.

The motive power may be steam combustion engines or electricity, and for underground boring, compressed air or electricity.

The amount of power for boring to 1000ft. is from 150 to 240 cubic feet of **free air** per minute, according to depth, or from 20 to 36 amperes at 220 volts if **electric power is used.**

Brazilian Carbon Diamonds, amorphous in structure and extremely hard, are used for boring hard rock.

The price of Carbon during 1906 fluctuated between £10 and £15 per carat. A carat equals 3.17 troy grains.

The Australian Bort is unsuitable for boring hard rock, because of its crystalline and granular structure, which renders it susceptible to fracture. The South African bort is too brittle to be of any use for boring, and Brazilian Ballas, being round and smooth, is deficient in the necessary cutting edges.

In rocks of extreme hardness, such as granite, diorite, felsite, and quartzite, from 60 to 100ft. per week may be drilled, and in rocks of medium hardness, such as slates, schists, indurate sandstones and diabase, from 100 to 150ft. per week.

The progress decreases as depth is attained by reason of the time necessary to draw and lower the line of tools. Slow progress is often made in fast cutting rocks by reason of the frequent necessity to draw the cores which plug in the core barrel.

Rocks are more favourable to boring when intersected at right angles to the cleavage plans.

The amount of water required to flush the diamond bit depends upon the nature of the rock being drilled. If the rock is reasonably solid the water returns to the stump and is re-used ; if the water goes away in crevices, or in permeable stratum, a maximum of 4000 gallons per day of 24 hours may be required ; or 300 gals. if tight strata.

The **cost of boring** ranges between 10/– and 25/– per lineal foot, according to the nature of the rocks to be intersected, and the conditions and cost of power supply and transportation. Cases of cheaper boring may occasionally occur under specially favorable conditions. Boring for quartz reefs or lodes is necessarily more expensive than boring in coal measures or basalt rocks by reason of slower progress and greater carbon expenditure.

COST OF PLANT.

Landed City Wharves—All States.

Diamond Prospecting Drill, capacity 300ft. = £200.

Diamond Drill, hydraulic feed, for steam or compressed air power vertical capacity 1000 feet, or horizontal, 800ft.—£500 to £700, according to equipment.

DIAMOND DRILL BORING.

Extract from N.S. Wales Mining Report.

Cost of Boring.

Sandstone and coal measures, 4/– to 9/–.

Bore at Broken Hill for minerals through quartzite, granite, diorite, gneiss, and mica slate, very hard strata, and destructive on diamonds. Total depth bored, 1122ft., days occupied, 133 ; rate per hour, 5.96 ins.; cost per foot, 16/–. These costs are exclusive of officers' salaries, rent, &c.

Cost of diamonds used per foot in depth, average from 1/– to 1/7.

A Simple Method of finding the Horse-power of an Engine.

P = Steam pressure in lbs. per sq. in. A = Area of piston in inches.
S = Stroke in feet. R = Revolutions × 2 per min.

In a Single Cylinder Engine the horse-power is found as under—

H.P. = P × S × A × R divided by 33,000.

In a single cylinder engine, the horse-power is found as stated ; in a compound engine, the horse-power in the high-pressure cylinder is found, using the pressure of the steam as shown by the boiler gauge, and adding the h.p. so found to that found in the low pressure cylinder using the steam pressure at the pressure it leaves the high pressure cylinder.

STRENGTH OF BUILDING MATERIAL.

London Builder.

Crushing weight in lbs. per square inch.

	Ordinary. lbs.	Dry. lbs.
Red deal	5750	6580
White deal	6780	7290
Spruce pine	6500	6820
Mahogany	8200	8200
Quebec oak	4230	5980
English oak	6480	10,050
Pitch pine	6790	6790
Yellow pine	5370	5440
Red pine	5400	7510
Willow	2900	6220

The above are picked specimens, without knots or flaws. The highest compression relied upon for pine, is 900, or not more than one-eighth the above tabulated strength.

MORTAR.

	lbs.
Lime and river sand ...	436
Lime and pit sand	578
Cement and pounded tiles	670

These mortars were 18 months old; they were again tried after 15 years, when the lime mortars had increased one-eighth in strength.

N. B.—The ascertained pressure borne by stone and brickwork in noted buildings, like the actual pressure trusted to in the use of timber, is about one-eighth of the tabulated strength.

MORTAR.

Tensile strength by Vicat.

	Per sq. in. lbs.
Sharp sand and best hydraulic lime	136
Do. and common lime ...	51

GRANITE.

	Per sq. in. lbs.
Aberdeen blue	10,900
Peterhead	8,260
Cornish	6,350
Kingstown (Irish) ...	10,110
Newry „	13,440

BUILDING STONES.

Arbroath paving	7,880
Caithness	6,490
Dundee sandstone... ...	6,630
Craigleith white freestone	5,480
Bramley fall, near Leeds	6,050
Derby grit (sandstone)	04,00
Yorkshire paving	5,710
Compact limestone ...	7,710
Anglesea, ditto	7,580
Valencia slate	10,940
Basalt, Irish test	11,970

BRICKS.

	Per sq. in. lbs.
Pale red	560
Red brick	800
Yellow face paviors ...	1,200
Stourbridge firebrick ...	1,710
North Wales, ditto ...	2,130
Brickwork in cement, Molesworth	1,000
Portland cement, Molesworth	1,000

CRUSHING WEIGHT.

	Per sq. in tons.
Cast-iron, mean crushing weight	38
Wrought iron	18
Ditto, compressive set begins about	12
Wrought iron, rolled bars	25
Do. angle iron and straps	24
Wrought plates, lengthwise	22½
Wrought plates, crosswise	20

TIMBER.—Tensile strength.

	Per sq. in. lbs.
Christiana deal	12,900
Elm	14,400
Mahogany	8,000
Oak, English	10,000
Pitch Pine	7,600
Teak	15,000
Lancewood (Rankine)	23,400
Beech (Molesworth)	20,000
Cedar, W. Indian, do	5,000
Red deal Baltic	11,400

AUSTRALIAN TIMBER.
Tensile strength, by F. A. Campbell, C.E.

	Per sq. in. lbs.
Blue Gum, Tasmania	26,700
White Gum, Victoria	27,800
Blackwood, Tasmania	25,000
Ironbark, N. S. W.	26,500
Stringy bark, Victoria	23,600
Red, or flooded gum	17,800
Kauri Pine, N. Zealand	10,700
Cedar, Queensland	3,000

AUSTRALIAN TIMBERS.

	Per cubic ft. lbs.
Jarrah, just felled	72
Ironbark, do.	75
Swamp Gum, do	63
Turpentine, do.	64
Totara Hokianga N.Z.	62
,, Puhoi, N.Z.	67

PORTLAND CEMENT.

Tensile strength.

	Per sq. in. lbs.
Neat cement, 3 tests	470
1 of cement to 1 of sand, 3 tests	329
1 of cement to 2 of sand, 3 tests	193
1 of cement to 3 of sand, 3 tests	140

The above are the *average* tests with 3 degrees of fineness, the finest cement being the best in each case. H. Reid's Work, on Portland cement, p. 325.

To Measure Pipes, Tanks, Etc.

The following is a rough-and-ready way to find the contents of circular tanks, wells, and pipes :—Square the diameter in inches, and cut off the right hand figure as a decimal, and the result will be gallons in each 3 feet (1 yard) of depth, or length, if a pipe—

Diameter Inches.		Pipes, Inches. Square.		Gallons in 3 feet.
2	2 × 2 =	4	or	0.4
6	6 × 6 =	36	or	3.6
12	12 × 12 =	144	or	14.4
WELL OR TANK.				
36	36 × 36 =	1296	or	129.6
100	100 × 100 =	10,000	or	1,000.0

To Find Amount of Interest by Practice.

In calculating Interest, the following table will be found valuable :

1¼	per cent.	is	1-80th	of 100	10	per cent. is	1-10th of 100
2	,,	,,	1-50th	,,	15	,, ,,	3-20ths ,,
2½	,,	,,	1-40th	,,	20	,, ,,	1-5th ,,
4	,,	,,	1-25th	,,	25	,, ,,	1-4th ,,
5	,,	,,	1-20th	,,	33½	,, ,,	1-3rd ,,

12

COMPARISON AUSTRALIAN AND OTHER TIMBERS.

The superior strength of Australian hardwoods, as compared to Deal and American Pine, generally used for scantlings of floors, roofs, &c in Great Britain and in Melbourne, has induced some of the Sydney architects to use much lighter scantlings and greater spaces than those given by Tredgold, Barlow, or Gwilt. This change was brought about mainly by the experiments made by Messrs. P. N. Russell & Co., in Sydney, in May, 1860, which are subjoined. The specimens were 1¼ inch deep, tapered at sides, the *sectional area being one square inch, the pieces experimented on were supported on hardwood bearers twelve inches apart.*

The experiments were conducted by Mr. J. W. Dunlop, in the presence of a number of gentlemen skilled or interested in such matters.

	Breaking weight, lbs.
Ironbark, average of 5 specimens	1210
Blackbutt ,, 4 specimens	857
Blue Gum ,, 2 specimens	759
Kauri Pine, New Zealand, 2 specimens	542
Oregon Pine, average of 2 specimens	722
Cedar, New South Wales, 2 specimens	416
American White Pine, average of 2 specimens	416

More recent information may be obtained on the strength of Australian timbers from Professor Warren's tests made at the Sydney University.

Wood Paving.—The relative suitability of the following Timbers for wood paving will throw considerable light on their nature and properties. The blocks were 6 inches deep, 3 inches wide, and 12 inches long. They had withstood the very heavy traffic of the busiest part of King-street, Sydney, for 14 months, and when examined and reported upon by the City Surveyor, in March, 1882, were in excellent order and condition. The measurement of the loss in depth by abrasion was in all cases taken where most worn.

Amount of wear in 14 months :—	Inch.
Red Gum, N.S.W.; Blackbutt and Blue Gum, N.S.W., each	1-16
Ash and Box, N.S. Wales growth	1-8
Brown Pine, N.S. Wales	3-16
Cedar, N.S. Wales	1-4
Baltic, European	3-8

The above trial clearly proves the economy and suitability of the Australian hardwoods for wood paving, the greatest amount of wear is scarcely appreciable. The superior character of the wood combined with the channel left between the blocks, as a foothold for the horses, are the main features in this highly successful wood paving.

Waste.—There is a reckless waste of timber going on throughout the State from unnecessary falling, barking, and ringbarking; also from bush fires, caused by carelessness. Most of the trees take from 50 to 100 years to come to perfection, and yet the forest reserves are only 1.89 per cent. of the area of the State.

TABLE showing the results of experiments on the properties of New South Wales and other timber :—

TIMBER.	Specific gravity or ounces per cube foot.	Elasticity or stiffness, Red Pine being 1.00.	Breaking weight in lbs. per square in., 12 in. bearing.	Ditto, or strength, Red Pine being 1.00.
Box, mean of 4 experiments ...	1,230	1.17	2,445	1.82
Iron bark, do. ...	1,211	0.91	2,288	1.70
Spotted gum, do...	1,035	1.06	2,006	1.49
Stringy bark, do...	937	0.75	1,818	1.36
Teak	745	1.31	2,462	1.84
Ash	760	0.89	2,026	1.50
Canadian oak ...	872	1,16	1,766	1.32
English oak ...	934	0.79	1,672	1.25
Pitch pine ...	660	0.61	1.632	1.22
Beech	852	0,74	1,556	1.16
Red pine	657	1.00	1,341	1.00
Riga fir	753	0.72	1,108	0.83
Elm	553	0.38	1.013	0.75

The first series of experiments were made at the Sydney Mint by the Commissioner of Railways in August, 1858.

The second series of experiments are taken from "Barlow on the Strength of Timber and Iron," and show the mean of three experiments on each description of timber, the samples being selected from Woolwich Dockyards.

The following Table is calculated from formulæ given by Barlow, viz. $W = \frac{4 A D^2 S}{L}$ in which W represents the breaking weight in lbs. of a piece of timber, A being its breadth, D its depth, L its length or bearing, and S the tabular strength of each square inch in sectional area: the value of S for different kinds of timber is given in the above table, where we find red pine to be 1,341. The result of the above formulæ may also be stated in cwts., thus $W = \frac{4 A D^2 1,341}{12 \times 112} = 4 A D^2$ and lastly $\frac{W}{4} A D^2$ the result given in the following table, from which may be ascertained the strength of any scantling, of timber, by multiplying the result, given in the following table, by the proportions stated in the fourth column of the above table, which I have cast out for this purpose.

EXAMPLE.—One-fourth of the breaking weight of a piece of red pine 14 inches deep by 12 inches in width, with a clear bearing of 20 feet. is shown by the following table to be 117.6 cwt. (see example at the end of table) this multiplied by 1.82 will be 214. cwt., equal to one-fourth of the breaking weight of box. the weight being applied in the centre of a beam or ½ of the breaking weight if distributed equally over the beam, as in a girder for a floor, shop window, &c.

The weights in this Table are—$\frac{1}{3}$th of the breaking weight of different scantlings, having 1 foot bearing, uniformly loaded; or $\frac{1}{4}$th of the same when suspended in the middle.

RULE.—To ascertain the strength of a piece of timber: Divide the third or cwt. column by the length or bearing of the timber, and the weight in cwts. will be obtained.

Depth.		Breadth.		Cwt.
1½	by	1	...	2·2
		1½	...	3·4
		2	...	4·5
		3	...	6·7
		4	...	9·0
		5	...	11·2
		6	...	13 5
		7	...	15·7
		8	...	18·0
		9	...	20·2
		10	...	22·5
		11	...	24·7
		12	...	27·0
2	by	1½	...	6·0
		2	...	8·0
		3	...	12·0
		4	...	16·0
		5	...	20 0
		6	...	24·0
		7	...	28·0
		8	...	32 0
		9	...	36 0
		10	...	40·0
		11	...	44·0
		12	...	48·0
3	by	2	...	18 0
		2½	...	22 5
		3	...	27 0
		4	...	36 0
		5	...	45 0
		6	...	54·0
		7	...	63·0
		8	...	72·0
		9	...	81·0
		10	...	90 0
		11	...	99 0
		12	...	108·0
4	by	2	...	32·0
		2½	...	40 0
		3	...	48·0
		3½	...	56·0
4	by	4	...	64·0
		5	...	80 0
		6	...	96·0
		7	...	112·0
		8	...	128·0
		9	...	144·0
		10	...	160·0
		11	...	176·0
		12	...	192·0
5	by	2	...	50·0
		2½	...	62·5
		3	...	75·0
		3½	...	87·5
		4	...	100·0
		5	...	125·0
		6	...	150·0
		7	...	175 0
		8	...	200 0
		9	...	225·0
		10	...	250·0
		11	...	275·0
		12	...	300 0
		13	...	325 0
		14	...	350·0
		15	...	375·0
6	by	2	...	72·0
		2½	...	90·0
		3	...	108·0
		3½	...	126·0
		4	...	144·0
		5	...	180·0
		6	...	216·0
		7	...	252 0
		8	...	288·0
		9	...	324·0
		10	...	360·0
		11	...	396·0
		12	...	432·0
		13	...	468·0
		14	...	504·0
		15	...	540 0
7	by	2	...	98·0
		2½	...	122·5
		3	...	147·0
		3½	...	171·5
		4	...	196·0
		5	...	245·0
		6	...	294 0
		7	...	343·0
		8	...	392 0
		9	...	441·0
		10	...	490 0
		11	...	539·0
		12	...	588·0
		13	...	637·0
		14	...	686·0
		15	...	735·0
8	by	2	...	128·0
		2½	...	160·0
		3	...	192 0
		3½	...	224·0
		4	...	256 0
		5	...	320·0
		6	...	384 0
		7	...	448 0
		8	...	512·0
		9	...	576·0
		10	...	640·0
		11	...	704·0
		12	...	768·0
		13	...	832·0
		14	...	896·0
		15	...	960·0
9	by	2	...	162·0
		2½	...	202·0
		3	...	243·0
		3½	...	283 5
		4	...	324 0
		5	...	405·0
		6	...	486·0
		7	...	567·0
		8	...	648·0
		9	...	729·0

TABLE OF THE STRENGTH OF RED PINE (*continued*).

Depth.	Breadth.	Cwt.
9 by	10	810·0
	11	891·0
	12	972·0
	13	1053 0
	14	1134·0
	15	1215·0
0 by	2	200·0
	2½	250·0
	3	300·0
	3½	350·0
	4	400·0
	5	500·0
	6	600·0
	7	700 0
	8	800·0
	9	900·0
	10	1000 0
	11	1100·0
	12	,00·0
	13	1300 0
	14	1400·0
	15	1500·0
11 by	2	242·0
	2½	302·5
	3	363·0
	3½	423·5
	4	484·0
	5	605·0
	6	726·0
	7	847 0
	8	968·0
	9	1089·0
	10	1210·0
	11	1331·0
	12	1452·0
	13	1573·0
	14	1694 0
	15	1815·0
12 by	2	288·0
	2½	360·0
	3	432 0
	3½	504·0
	4	576·0
	5	720·0
	6	864·0
	7	1008 0
	8	1152·0
	9	1296 0
	10	1440 0
	11	1584·0
	12	1728·0
	13	1872·0
	14	2016·0
	15	2160·0
13 by	2	338·0
	2½	422·5
	3	507·0
	3½	591·5
	4	676·0
	5	845·0
	6	1014·0
	7	1183·0
	8	1352·0
	9	1521·0
	10	1690 0
	11	1859·0
	12	2028·0
	13	2197·0
	14	2366·0
	15	2535·0
14 by	2	392·0
	2½	490·0
	3	588·0
	3½	686 0
	4	784·0
	5	980·0
	6	1176·0
	7	1372·0
	8	1568·0
14 by	9	1764·0
	10	1960·0
	11	2156·0
	12	2352·0
	13	2548 0
	14	2744·0
	15	2940·0
15 by	2	450·0
	2½	562·5
	3	675·0
	3½	787·5
	4	900·0
	5	1125·0
	6	1350·0
	7	1575 0
	8	1800 0
	9	2025·0
	10	2250 0
	11	2475·0
	12	2700·0
	13	2925·0
	14	3150·0
	15	3375·0
16 by	2	512·0
	2½	640 0
	3	768·0
	3½	896·0
	4	1024 0
	5	1280·0
	6	1536 0
	7	1792 0
	8	2048·0
	9	2304·0
	10	2560·0
	11	2816·0
	12	3072 0
	13	3328 0
	14	3584·0
	15	3840·0
	16	4096 0

EXAMPLE.

Required the strength of a piece of timber 20 feet clear bearing, and 14 inches deep by 12 inches wide.

Opposite the scantling 14 by 12 will be found 2352·0 cwt. Divide this by 20 feet and the result will be 117·6 cwt.

The comparative strength of various scantlings may also be seen at a glance. Also the comparative strength of a piece of timber laid flatwise, and other of e same dimensions on edge.

Strength of Ironbark and Stringybark.

The remarks at the head and foot of last Table apply also to this—
D signifies depth and B breadth,

D. B. in. in.	Iron-bark. cwt.	Stringy-bark. cwt.	D. B. in. in.	Iron-bark. cwt.	Stringy-bark. cwt.	D. B. in. in.	Iron-bark. cwt.	Stringy-bark. cwt.
2 by 1½	10.2	8.2	5 by 2	85	68.	7 by 5	417	333.
2	13.6	10.9	2½	106	85.	6	500	400.
3	20.4	16.3	3	128	102.	7	583	466.
4	27.2	21.8	3½	149	119.	8	666	533.
5	34.0	27.2	4	170	136.	9	750	600.
6	40.8	32.6	5	213	170.	10	833	666.
7	47.6	38.1	6	255	204.	11	916	733.
8	54.4	43.5	7	298	238.	12	1000	800.
9	61.2	49.0	8	340	272.	13	1083	866.
10	68.0	54.4	9	383	306.	14	1166	933.
11	74.8	59.9	10	425	340.	15	1250	1000.
12	81.6	65.3	11	468	374.			
			12	510	408.	8 by 2	228	174
3 by 2	30.6	24.5	13	553	442.	2½	272	218
2½	38.2	30.6	14	595	476.	3	326	261
3	45·9	36.7	15	638	510.	3½	381	305
4	61.2	49.0				4	435	348
5	76.5	61.2	6 by 2	122	98.	5	544	435
6	91.8	73.4	2½	153	122.	6	653	522
7	107	85.7	3	184	147.	7	762	609
8	122	97.9	3½	214	171.	8	870	696
9	138	110.	4	245	196.	9	979	783
10	153	122.	5	306	245.	10	1088	870
11	168	135.	6	367	294.	11	1196	957
12	184	147.	7	428	343.	12	1306	1044
			8	490	392.	13	1414	1132
			9	551	441.	14	1523	1219
4 by 2	54.4	43.5	10	612	490.	15	1632	1306
2½	68.0	54.4	11	673	539			
3	81.6	65.3	12	734	588	9 by 2	275	220
3½	95.2	76.2	13	796	636	2½	343	275
4	109	87.1	14	857	685	3	413	330
5	136	109.	15	918	734	3½	482	386
6	163	131.				4	551	441
7	190	152.				5	689	551
8	218	174.	7 by 2	167	133.	6	826	661
9	245	196.	2½	208	167.	7	964	771
10	272	218.	3½	250	200.	8	1102	881
11	299	239.	3	292	233.	9	1239	991
12	326	261.	4	333	267.	10	1377	1101

STRENGTH OF IRONBARK AND STRINGYBARK.—*Continued.*

The remarks at the head and foot of last Table apply also to this—D signifies depth and B breadth.

D. in.	B. in.	Iron-bark. cwt.	St'ngy-bark. cwt.	D. in.	B. in.	Iron-bark. cwt.	St'ngy-bark. cwt.	D. in.	B. in.	Iron-bark. cwt.	St'ngy-bark. cwt.
9 by	11	1515	1212	12 by	2½	612	490	14 by	9	2999	2399
	12	1652	1322		3	734	588		10	3332	2666
	13	1790	1432		3½	856	685		11	3665	2932
	14	1928	1542		4	979	783		12	3998	3299
	15	2066	1652		5	1224	979		13	4332	3465
					6	1468	1175		14	4665	3732
10 by	2	340	272		7	1714	1371		15	4998	3998
	2½	425	340		8	1958	1567				
	3	510	408		9	2203	1763	15 by	2	765	612
	3½	595	476		10	2448	1958		2½	956	765
	4	680	544		11	2693	2154		3	1148	918
	5	850	680		12	2938	2350		3½	1339	1071
	6	1020	816		13	3182	2546		4	1530	1224
	7	1190	952		14	3427	2742		5	1913	1530
	8	1360	1088		15	3672	2938		6	2295	1836
	9	1530	1224						7	2678	2142
	10	1700	1360	13 by	2	575	460		8	3060	2448
	11	1870	1496		2½	718	575		9	3443	2754
	12	2040	1632		3	862	690		10	3825	3060
	13	2210	1768		3½	1006	804		11	4208	3366
	14	2380	1904		4	1149	919		12	4590	3672
	15	2550	2040		5	1437	1149		13	4973	3978
					6	1724	1379		14	5355	4284
11 by	2	411	329		7	2011	1609		15	5738	4590
	2½	514	411		8	2298	1839				
	3	617	494		9	2586	2069	16 by	2	870	696
	3½	720	576		10	2873	2298		2½	1088	870
	4	823	658		11	3160	2528		3	1306	1044
	5	1029	823		12	3448	2758		3½	1523	1219
	6	1235	987		13	3735	2988		4	1741	1393
	7	1440	1152		14	4022	3218		5	2176	1741
	8	1646	1316		15	4310	3448		6	2611	2089
	9	1851	1481						7	3046	2437
	10	2057	1646	14 by	2	666	533		8	3482	2785
	11	2263	1810		2½	833	666		9	3917	3133
	12	2468	1975		3	1000	800		10	4352	3481
	13	2674	2139		3½	1166	933		11	4787	3830
	14	2880	2304		4	1333	1066		12	5222	4178
	15	3085	2468		5	1666	1333		13	5668	4526
					6	1999	1599		14	6093	4874
					7	2332	1866		15	6528	5222
12 by	2	490	392		8	2666	2132		16	6963	5571

N.B.—In using the tables showing the strength of Baltic red pine, Iron bark and Stringy bark, the length of the bearers should not exceed 24 times their depth.

Strength of Spotted Gum and Box.

The remarks at head and foot of the first Table apply also to this--
D signifies depth and B breadth.

D. in.	B. in.	Spotted Gum cwt.	Box. cwt.
2	by 1½	9.1	10.9
	2	12.2	14.6
	3	18.3	21.9
	4	24.3	29.1
	5	30.6	36.7
	6	36.7	44.0
	7	42.8	51.3
	8	48.9	58.6
	9	55.1	66.1
	10	61.2	73.4
	11	67.3	80.7
	12	73.4	88.1
3	by 2	27.	33.
	2½	34.4	46.3
	3	41.3	49.5
	4	55.1	66.1
	5	68.8	82.4
	6	82.6	99.1
	7	96.3	105.5
	8	109.9	131.8
	9	124.	149.
	10	137.	164.
	11	151.	181.
	12	165.	198.
4	by 2	50	60
	2½	61	73
	3	73	88
	3½	86	103
	4	98	118
	5	122	146
	6	147	176
	7	171	205
	8	196	235
	9	220	264
	10	245	294
	11	269	323
	12	293	352
5	by 2	76	91
	2½	95	114
	3	115	138
	3½	134	161
	4	153	183
	5	191	229
	6	229	275
	7	268	321
	8	306	367
	9	344	413
	10	382	458
	11	421	505
	12	459	551
	13	497	596
	14	535	642
	15	574	689
6	by 2	110	132
	2½	137	164
	3	165	198
	3½	192	230
	4	220	264
	5	275	330
	6	330	396
	7	385	462
	8	441	529
	9	496	595
	10	551	661
	11	606	727
	12	661	793
	13	716	859
	14	770	924
	15	826	1091
7	by 2	150	180
	2½	187	224
	3	225	270
	3½	262	314
	4	300	360
7	by 5	375	450
	6	450	540
	7	524	629
	8	599	718
	9	675	810
	10	749	898
	11	824	989
	12	900	1080
	13	974	1168
	14	1049	1258
	15	1125	1350
8	by 2	201	241
	2½	245	294
	3	293	351
	3½	343	411
	4	391	469
	5	489	586
	6	587	767
	7	685	822
	8	783	939
	9	881	1057
	10	979	1175
	11	1076	1291
	12	1175	1410
	13	1273	1527
	14	1376	1651
	15	1469	1763
9	by 2	247	296
	2½	309	370
	3	371	445
	3½	434	521
	4	496	595
	5	620	744
	6	743	891
	7	867	1042
	8	991	1189
	9	1115	1338
	10	1239	1486

Strength of Spotted Gum and Box.

The remarks at the head and foot of the first Table apply also to this
D signifies depth and B breadth.

D. in.	B. in.	Spotted Gum. cwt.	Box. cwt.	D in.	B. in.	Spotted Gum cwt.	Box. cwt.	D. in.	B. in.	Spotted Gum. cwt.	Box cwt.
9 by	11	1363	1635	12 by	2½	551	661	14 by	9	2699	3238
	12	1487	1784		3	661	795		10	2999	3599
	13	1561	1873		3½	770	924		11	3298	3957
	14	1736	2083		4	881	1057		12	3648	4377
	15	1859	2231		5	1101	1321		13	3898	4677
					6	1321	1565		14	4198	5037
10 by	2	306	367		7	1542	1850		15	4498	5397
	2½	382	458		8	1762	2114				
	3	459	551		9	1983	2379	15 by	2	668	825
	3½	535	642		10	2203	2643		2½	860	1032
	4	612	734		11	2423	2907		3	1033	1239
	5	765	918		12	2644	3173		3½	1205	1446
	6	918	1101		13	2864	3437		4	1377	1652
	7	1071	1285		14	3084	3701		5	1721	2065
	8	1224	1469		15	3305	3866		6	2065	2478
	9	1377	1632						7	2410	2892
	10	1530	1836	13 by	2	517	620		8	2754	3305
	11	1683	2019		2½	646	775		9	3098	3717
	12	1836	2203		3	726	871		10	3442	4130
	13	1989	2387		3½	905	1086		11	3787	4542
	14	2142	2570		4	1034	1241		12	4131	4955
	15	2295	2754		5	1293	1541		13	4475	5370
					6	1551	1861		14	4819	5782
11 by	2	370	444		7	1810	2172		15	5165	6196
	2½	462	554		8	2068	2481				
	3	555	666		9	2327	2792	16 by	2	783	939
	3½	648	777		10	2585	3102		2½	979	1174
	4	740	888		11	2844	3413		3	1025	1220
	5	926	1111		12	3103	3723		3½	1371	1645
	6	1106	1327		13	3361	4033		4	1567	1880
	7	1296	1555		14	3620	4344		5	1958	2349
	8	1481	1777		15	3879	4655		6	2350	2820
	9	1666	1999						7	2741	3289
	10	1851	2221	14 by	2	600	720		8	3133	3759
	11	2036	2443		2½	750	900		9	3575	4290
	12	2221	2665		3	900	1080		10	3916	4699
	13	2406	2887		3½	1049	1259		11	4308	5169
	14	2592	3110		4	1200	1440		12	4700	5640
	15	2776	3331		5	1500	1800		13	5097	6116
					6	1800	2160		14	5483	6579
					7	2099	2519		15	5875	7050
12 by	2	441	529		8	2399	2878		16	6267	7520

BUILDING MATERIALS OF N. S. WALES.

GIVING THE LOCALITY WHERE OBTAINED OR MANUFACTURED.

Asbestos.—This valuable material may now be reckoned in building materials, as it is used largely in the making of walling sheets and slates for roofs. It is stated that a find of asbestos has been made at Eucharena, between Wellington and Orange. The lode is said to be 70ft. wide.

Basalt or Bluestone and Diorite.—Although not plentiful near Sydney, is generally distributed throughout the eastern half of the colony, and is well adapted for road metal, curbing and channelling, tar concrete, &c. It will be found at or near the following towns south of Sydney:—**Camden, Campbelltown, Berrima,** Nattai, Robertson, Murrimba, Wollondilly, and **Cookbundoon** Rivers; Pomeroy, near **Goulburn, Crookwell, Boorowa, Gundagai, Coolac**; near Tumut, **Adelong,** Tumberumba, Yarrangobi, **Kiandra,** Seymour, **Cooma, Cathcart,** and Wyndham, near **Blombaa,** near **Bega,** near Moruya, **Jervis Bay, Farnham, Kiama, Jamberoo,** Macquarie Rivulet near **Lake Illawarra,** Hornsby and Pennant Hills, near Sydney. One of the finest blue metal quarries was opened in the district of Mittagong.

Kiama.—Large quantities of blue metal are obtained from **Kiama.**

To the west of Sydney, basalt is found near Liverpool and Richmond, at **Emu Plains** near **Penrith,** at Rockley, Rydal, Mount Victoria, near **Bathurst, Blayney, Frederic,** Orange, **the Canoblas, Currajong,** near Parkes, and **Lake Cudjullagong,** on the Lachlan River.

To the north-west it is found at Hill End and Tamberoora, Hargreaves, Sofala, Newrea, Wellington, Mudgee, Dubbo and Rylstone, also at Crete, Grestore, Muswellbrook, Scone, Murrurundi, Wallabadah, Doughboy Hollow, north-west of Coonabarrabran.

To the north it is found near Gloucester, near Stroud, on the Hastings River, near Port Macquarie, West Kempsey, Nundle, Tamworth near Walcha, near Armidale, Uralla, Falconer, Glen Innes, near Newtown Boyd, near Gordon and Tabulam on the Clarence River, Lismore, &c., on the Richmond River, the Tweed River, also at Deepwater on the Severn Rivers, Wellingrove, Byron, Inverell, &c.

BRICKS.

Fire Clay and superior bricks are made at Enfield, Newtown, Liverpool, Lithgow Valley, Brisbane Water, Wollongong, Mudgee, Wallerawang, Bulli, Granville, Yass, Bathurst, Dapto, Tamworth, Armidale, Broken Hill, Albury, Vegetable Creek, &c., and may be looked for generally on the coal measures and the country between Berrima and the Hawkesbury River.

GRANITE.

Granite is found at Tamworth, Trial Bay, Gabo Island, Moruya, &c. The polished granite columns of the Post-office at Sydney are Moruya granite.

A **finer grained granite** has also been procured from Montague Island, about 20 miles south of Moruya. Blocks of granite, weighing 16 tons, were brought from the above localities and used in the General Post Office, Sydney.

A **light red granite** is found at Trial Bay, and has been used there in the erection of a lighthouse, &c.

GYPSUM.

Gypsum (*sulphate of lime*) crystallised and amorphous or lumpy, is found in large quantities near Mount Browne goldfields, Balranald. As before stated, it is easily burnt into plaster of Paris, as limestone is burnt into lime.

Limestone, dense blue, from Port Stephens ; cream colour, with brown veins, from Mudgee. Limestone and marble are both converted into lime, the marble being limestones hard enough to receive a polish ; there are also tertiary and tufaceous limestones, used chiefly for lime.

From the Mineral Statistics of New South Wales, I find that a grey crystalline limestone is found near Wollongong, containing :— Carbonate of lime, 74.3 ; carbonate of magnesia, 0.8 ; alumina, 7.3 ; oxide of iron, 3.1 ; phosphoric oxide, 0.4 ; silica, 10.7 ; organic matter and water, 3.4. This limestone when burnt gives a brownish hydraulic lime.

Bulli Purple Limestone shows a 5-feet seam.

Mountain Limestone.—The Fish River, Binda or Jenolan Caves, Yarrangobilli Caves, Wellington Caves, and Cavan Caves, near Yass, are in this formation.

Limestone is also found at Kempsey, Nundle, Murrurundi Scone, Copeland, Dubbo, Wyndeyer, Ironbarks, Parkes, Forbes, Orange, Cow Flat, Caloola, Tuenna, near Junee, Jugiong, Yass, Goulburn, Gundagai, Adelong, Kiandra, Braidwood, Wingham, Gloucester, Stroud, Ophir, Wallerawang, Rockley, Bookham, Queanbeyan, Bombala, &c., being most prevalent in the silurian or goldfields formation, and extensive lime kilns have lately been erected at Bowning, near Yass, and also at Piper's Flat.

MARBLE.

Some of the finest and soundest marbles in the world are found in New South Wales, coming from the district of Orange and Bathurst. The quarries at Caloola Creek, near Newbridge, Borenore, and Fernbrook, produce coloured marble of great beauty, and white marble of great purity. The base of Queen Victoria's Memorial statute in Melbourne is of this Caloola marble. Her Majesty's Theatre, Sydney, staircase, Stanway house, and many other offices and banks, are from **Borenore**, and in colour are Rouge, Breccii, and St. Annes.

Queen Alexandra Rouge and variegated, and marbles most brilliant in tones, are found there.

There is also good red and **white** marble at Tamworth, and **black marble** at Biddenlake.

Marulan Marble.—Grey, reddish purple, and black. The quarries are now idle.

Cow Flat marble is white, and was used with the black marble from Marulan in flooring the great hall of the Sydney University.

Wallerawang Marble (white, cream and dove colour), can be obtained of any size. The quarries are seven miles from Wallerawang railway station. The Portland cement quarries are in that district.

FREESTONE.

Sandstone (free), suitable for building and grindstones, is quarried in Sydney and suburbs, and also at Willoughby, Manly, Brisbane Water, Lithgow Valley, and Parramatta. These latter are from the same geological formation as the coal measures, and therefor similar to the Sydney (free) sandstone so largely used in the best buildings of Sydney, &c.

Sandstone, varying greatly in hardness and cost of dressing, is obtained from Pyrmont, Sydney. Ordinary free standstones are also quarried at Randwick, Mosman's Bay, North Shore, Hunter's Hill, Parramatta, Waverley, and along the Illawarra line.

Pyrmont Sandstone, from the lower beds, of yellow colour, withstood a pressure by Professor Warren when applied to 3 inch cubes of 39,000lbs., and to 4 inch cubes of 100,000lbs. An equal sided cube foot sustained a pressure for 20 minutes of 200 tons when tested.

Good Sandstone, suitable for building, is also found at East Maitland, Morpeth, Clarence Town, Muswellbrook, Rutherford, and Ravensfield. All these are similar to the Sydney sandstone, and generally of a creamy or sienna colour. At Paterson, on the Hunter River, it is of a greenish tinge, and at Wollombi of a pink and light brown tint.

Sandstone (*Silurian*), from Albury and Mudgee, Goulburn, Bukingbong, and Narrandera. These sandstones are harder and in smaller beds than those from the coal measures, and may be looked for on all the goldfields. They are not so good for building blocks, being strongly laminated.

Grey Stone is found at Molong and Orange, in level beds, and is good for flagging, steps and sills having been used in Government buildings there.

The **price** for **clean chiselling** this stone is 2s. per super. foot.

SLATE.

Silurian or goldfields formation.—A third class slate, from Kerraway, near Goulburn, also at Cookbundoon.

South Gundagai Slate.—A superior kind of slate is found here. At Millamurrah, near Bathurst, 18,000 slates were taken out.

TERRA COTTA.

Terra Cotta of a superior class is made at the Sydney potteries, Enfield, Camperdown, Granville, Liverpool, St. Peters; also at Lithgow Valley and Albury, &c.

TRACHYTE.

Is found at Mittagong and Bowral, and is used in the railway bridge over the Hawkesbury River, to resist decay from sea water.

Trachyte, light blue, from Bowral, Mittagong and Clarence Town. Bowral stone was used for the Centennial Hospital at Camden. It has also been used in the basements and lower stories of Government and other buildings in Sydney, the piers of entrance to the Garden Palace, &c., besides kerbing and guttering.

The **cost of working** is between bluestone and Adelaide marble or Moruya granite. (See stonecutting).

BUILDING TIMBERS, N.S.W.

Building Timber.—Australian timber, because of its superior qualities, is appreciated, not only in Australia, but in America and Europe. The blue-gums are the largest and highest trees in the world, eclipsing the gigantic trees of California. An American writer refers to a tree planted in Algiers 15 years ago, which had attained the size of an oak 100 years old. The eucalyptus, or gum trees, have been largely planted in Italy at all elevations above the sea, and where planted near miasmitic swamps, have changed those localities into healthy spots.

TEST of AUSTRALIAN HARDWOODS for STRENGTH & ELASTICITY.

The different **State Governments** now publish complete and exhaustive reports on the different kinds of Australian timber, with their description, and the various tests applied, so in this issue I have only referred briefly or given a few instances that may be useful.

Taking into account the well-known properties of ironbark and spotted gum, the experiments at the Sydney Mint are most reliable, and from these I have compiled the Tables showing their relative strength. Even if all the samples experimented upon were taken from trees of the same age, grown in similar soil and climate, felled at the same season, taken from similar portions of the trunk, seasoned in the same manner and for the same time, the results might not be the same ; because colonial timbers, called by the **same name** in the different colonies, are found **not** to be identical when compared by botanists ; hence the botanical name and properties are the only reliable data in cases of identity.

Strength of Timber.—On a previous page I have given the result of the most reliable experiments hitherto tried upon the strength and elasticity of some of the Australian hardwoods. The pieces tried were well seasoned, picked specimens, $1\frac{3}{4}$ inches square, supported at each end with a clear bearing of 4 feet, the weight being applied in the centre, and with the following results :—

	Breaking weight in lbs.	Weight in centre without injury in lbs.	Ultimate deflection in inches.
Box, mean of 4 experiments ..	1092	658	0.90
Ironbark ditto ..	1022	742	1.31
Spotted Gum ditto ..	896	560	0.85
Stringy Bark ditto ..	812	560	1.20

GIVING THE LOCALITY WHERE OBTAINED OR MANUFACTURED.

Basalt or Bluestone, of volcanic or igneous origin, and forms some of the largest plains of Australia, is found near Melbourne, although very durable, it is not used where a light appearance or architectural effect is required. It is well adapted for foundations, basements, kerbing and guttering, flagging, &c.

Bricks, Etc.—In consequence of the absence of good freestone in Melbourne, the manufacture of ornamental bricks is a fine art, and good brick architecture has resulted.

Cement Tiles, etc.—These are made by the Australian Tesselate Tile Co., of Melbourne, Commonwealth Mosiac Ornamental Tile Co., of Sydney.

The tiles are from 6s. 6d. to 16s. per super yard.

See Tiler, page 238.

GRANITES.

A first-class **Grey and Cream colour** Granite is found at Beechworth.

Grey granite is found at **Sandhurst, Mount Alexander, Harcourt.** The latter is the finest and best. It is made into columns, polished, and exported.

Granite is also obtained from Mount Eliza, Mount Martha, Palenty Ranges, Mount Blackwood, Refuge Cove, Gabo Island, &c. The latter granite is probably the hardest and most durable.

Cement (Portland).—Mitchell's Emu Brand, made at Richmond, near Melbourne. This Victorian cement stands a good test.

Terra Cotta.—There are good specimens of terra cotta work (buff and red), and roof tiles, also agricultural pipes, and walling and floor lumber, made at Terra Cotta Works at Brunswick.

SANDSTONE.

Sandstone, suitable for building, is obtained from the various goldfields, but it is generally very hard, laminated, and often micaceous, and is therefore better adapted for flagging or flat-bedded rubble. A soft sandstone was obtained at Bacchus Marsh, and used for the Treasury in Melbourne ; also a similar sandstone from Darley, near Bacchus Marsh, which was used for the back facade of the Parliament Houses in Melbourne. Both these free sandstones are too soft and friable for permanent buildings.

Stawell Free Sandstone is obtained from the Grampian Hills, about eighteen miles from Stawell. The front of the Town Hall at Stawell is now found not to be a fair sample of this stone. It is a fine close-grained heavy sandstone, and apparently of a durable quality ; but its appearance in the above building is greatly marred by particles of ironstone thinly interspersed, which, when exposed to the weather, disintegrate or waste away, running down the face of the stone and staining it. This defect is greatly modified in the best of the stone used for the addition of a third storey to the General Post Office, Melbourne.

The **cost of working** the Stawell sandstone is about 50 per cent more than the Tasmanian freestone.

Barrabool Hill Free Sandstone is found near Geelong, and has been largely used there, and in building St. Paul's Cathedral, Melbourne.

SLATE.

Slate is found in many parts of Victoria.

Castlemaine Slate for flagging, steps and sills, landings, hearths, &c. It is equal, on the whole, to the Welsh slate for that purpose. It is said to be much stronger than Caithness flagging or sawn bluestones.

LIMESTONES.

Limestones suitable for building are found near Geelong; the Waurn Ponds free limestone was introduced into Melbourne about 1877 from near the surface; the quarry now being fully opened, the stone is found to be much harder, and was used in building St. Paul's Cathedral, Melbourne; it is much cheaper than the Oamaru free limestone.

Lithographic Limestone is also found at **Geelong.** It is very hard, of a dark drab; will take a polish; it is full of holes filled with composition, and is burned into lime at Geelong.

Portland, Warrnambool and Malmsbury Limestones are granulated and porous; they are used for building-stone or burnt into lime.

Lime is made from the above limestones from Sandhurst.

Recent or Tertiary Limestone is found throughout the north-western portions of the colony, between the settled districts and the Murray River on the north, extending into South Australia on the west. It is also found at Benalla and the Delegate River.

On or near the coast limestone is found at Belfast, Cape Otway, Western Port, Cape Patterson, Cape Liptrap, Lake Victoria, and Ninety-mile Beach.

Hydraulic Lime, the lithographic limestone, produces a lime, slightly hydraulic. The lime made at Limestone Creek, near Guildford, and Bacchus March, is also hydraulic. The Collingwood or Fitzroy limestone is highly so, containing 52 per cent. carbonate of lime; 18 per cent. carbonate of magnesia; 12 per cent. alumina; and 18 per cent. hydraulic silica. This limestone is very limited in extent.

The lime is said to be similar in appearance and properties to the noted Blue Lias lime.

Septaria, in the form of white and grey cement stones, are obtained at Spring Creek, 15 miles from Geelong. Mr. Selwyn, the late Government Geologist of Victoria, in his report of July, 1854, refers to a bed of stiff blue clay containing bands and septaria of hard grey argillaceous limestone, "nodules of precisely similar nature are extensively collected for the manufacture of cement from the London clay, the cliffs of Hampshire, the Isle of Sheppey, &c."

Much additional information on the subject may be obtained from the Victorian Government "Prize Essay on Economical Manufactures," by C. Mayes, C.E., obtained at the Public Libraries Melbourne, and Sydney.

The geological maps of Victoria afford much practical information.

Shell Lime is made on most parts of the coast, but it is only fit for internal plastering. The shells might be crushed and used with clay for making a cement.

QUEENSLAND BUILDING MATERIALS.

GIVING THE LOCALITY WHERE OBTAINED OR MANUFACTURED.

Freestone.—*Sandstone and Fire-clay* will be found in all the Coal fields of Queensland, the dip is flat and never exceeds 30 degrees.

Breakfast Creek quarry, about 3½ miles from Brisbane, has supplied most of the stone used in Brisbane, and is the stone quoted in my price list. It is durable, fine grained, and of a suitable colour.

Flagging and Slate will generally be found in all goldfields; the dip is rarely less than 50 degrees, mostly nearly vertical.

The sandstone found near Brisbane and in the southern districts of Queensland belongs to the coal measures, and has its prototype in Sydney and suburbs. The **cost of working** is also the **same.**

Goodna, on the Brisbane River, abounds in good sandstone quarries from which the sandstone for the Parliament House, Government House and Town Hall were obtained.

Grantham.—Abundance of first-class sandstone is found varying in color from white to brown. It was used in the Government Printing Office, Brisbane, and is also largely used for grindstones.

Helidon abounds in good, hard and durable sandstone from which grindstones have been made. Pearson's quarries are here. The stone varies much in colour (white, brown and liver), the liver and brown coloured stone being very durable. The Custom House and National Bank, Brisbane, are built of this stone.

Highfield quarries, from which the stone was obtained for the Treasury Buildings; some of it is second-class stone, and will require coating with some waterproof liquid to preserve its face from decay. As some of the stone is better than the bulk of it, it shows that the beds vary in quality. This is borne out by the great difference in the analysis of different samples of the stone analysed by different analysts.

Ipswich Coal Measures.—The coal measures also produce fine brick earth or shales from which the best bricks, tiles and terra cotta are made. The coal measures are also found at Maryborough, Rockhampton, Warwick, West Moreton, and Brisbane.

Murphy's Creek quarries yield good stone, similar to that found near Goodna.

Mogul, 4 miles from Goona, good sandstone, with very fine black specks, which are scarcely perceptible, and of no detriment to its appearance or durability. It can be obtained of any size up to 50 tons.

Warwick Railway Station and Town Hall are built with sandstone from Mount Storat quarry. The new Hospital is built of stone from the Sareb quarry. The Masonic Hall is built of stone from Bishop Tuffnell's quarries.

Granite.—At Gilbert goldfields **red granite** is found.

Ravenswood goldfields, **green granite.**

Marbles or Limestones hard enough to polish.

Ravenswood.—**Statuary marble.**

Broken River.—**Tropical Queensland. Black fossil marble,** also **basalt** or **bluestone.**

Gladstone variegated marble (marble front).

Calliope River.—**Rose, black, white, yellow,** and other marbles.

Rockhampton.—**Variegated** marbles from quarry, Northumberland Group ; also from Percy and other islands on the Queensland coast.

Warwick.—**Black** and **white statuary** marbles.

Porphyry.—This is a peculiar conglomerate of primitive rocks of all tints, pink predominating. It is used in Brisbane for the bases of buildings, kerbing, channelling, and metalling the streets, &c. The R.C. Church is wholly built of it ; the Normal School also, with sandstone dressings to openings. It is much harder than the freestone, but not so hard or costly to work as the Melbourne bluestone.

TIMBER TREES OF QUEENSLAND.

The Queensland Maple, also called silkwood or red beech, is a light coloured timber ; grows principally north of Townsville, 50 or 60 miles inland along the coast line, and is a very sound wood, available in large sizes. The tree grows up to 20 feet girt. It is the fancy wood of Queensland (1914), and is suitable for furniture, shop and office fittings, and is now extensively used in superior work, taking the place of cedar in joinery in all the Australian States.

The Government are using it for railway and tram car interior and construction.

Moreton Bay Ash (*Euc. tesselaris*).—Diam., 14 to 25 inches ; height, 30 to 60 feet. Timber of a brownish colour, not hard, but tough ; it is found north and south in the colony.

Moreton Bay Pine (*Araucaria*).—Diam., 30 to 60 inch ; height, 150 to 200 feet. The timber is used extensively in this colony. The wood is strong and durable when kept dry, but soon decays when alternately damp and dry. When procured from the mountains of the interior it is fine-grained, and is susceptible to a high polish. Some trees yield as much as 10,000 feet of saleable timber.

Peppermint of Turpentine Tree (*Euc. microcorys*).—Diam., 18 to 36 inches ; height, 60 to 80 feet. Timber strong and durable.

Red Gum (*Euc. terreticornis*).—Diam., 18 to 36 inches ; height, 60 to 90 feet. Used in fencing, building, plough-beams, poles, and shafts of drays, and also in ship-building.

She Oak, River (*Cas. glauca*).—Diam., 24 to 36 inches ; height, 70 to 90 feet. A robust tree, and grows on the borders of rivers and creeks. The timber is strong and tough, used for staves, shingles, &c.

Spotted Gum (*Euc. maculata*).—Diam., 20 to 36 inche ; height, 60 to 80 feet. It is a very valuable timber, on account of its strength and elasticity ; used for buggy shafts, cogs of wheels, &c. In bridge-building it is used for tie-beams, &c., and is found to have the highest constant strength of any of the Queensland timbers.

ABSTRACT FROM MR. W. SOUTERS' GOVERNMENT REPORT
Giving the most useful Trees for Carpentry, Joinery, etc.

COMMON NAME.	BOTANICAL NAME.	USE.
Stave wood	Tarrietia argyrod'ndron	General carpentry
,, ,, ...	,, trifoliata ..	,, ,,
,, ,, ...	,, actinophylla	Tool handles
White beech	Elœcarpus Kirtonii ..	Furniture, etc.
,, ,, ...	,, Bancroftii ..	Masts and blocks
Quangdong	,, grandis ..	General carpentry
Pencil cedar	Dysoxylon Mulleri ..	Cabinet and joinery
,, ,, ...	,, Frazeranium	,, ,,
Emu apple	Owenia venosa ..	General carpentry
Red cedar	Cedrela Toona	Cabinet and joinery
Crows ash	Flindersia australis ..	General carpentry
Common yellow wood	,, Oxleyana ..	Coachbuilding, etc.
Spotted tree	,, maculosa ...	,, ,,
,, ,, ...	,, Bourjotiana	General Work
,, ,, ...	,, Strzeleckiana	,, ,,
,, ,, ...	,, ,, Latifolia	,, ,,
Native tamarinal ..	Diploglottis Cunning-hamii	,, ,,
Native "Tuckeroo"	Cupania anacardiodes	Tool handles, etc.
Bean tree	Castanospermum aus-trale	Cabinet and turnery
Leguminous Ironbark	Erythrophlœum labou-cherii	Hardest wood in Aus-tralia
Brigalow	Acacia harpophylla ...	Carpentry
Ironbark wattle ..	,, excelsa	General carpentry
A rosewood	,, glaucescens ...	Cabinet, turnery, etc
Ringy rosewood ..	,, ,, variety	,, ,, ,,
Black wattle	,, Cunninghamii	,, ,, ,,
Hickory wattle ..	,, aulacocarpa	Cabinet work
Acacia cedar	Albizzia Toona ..	General carpentry
Scrub redwood ..	Weinmannia lachno-carpo	Tool handles, mallets, etc.
Red bottle brush ..	Callistemon lanceolatus	Ship and wheelrights
Apple tree	Angophora subvelutina	Wheelrights
,, ,, ...	,, intermedia	,,
Gum-topped box ...	Eucalyptus hemiphloia	Building
Ironbark	,, siderophloia	General purpose, gum
Narrow-leaved iron-bark	,, creba ...	,, ,,
Iron gum tree ...	,, Raveretiana	Building and cabinet
Coolibar	,, microtheca	,,
Sw'mp mahog'ny gum	,, robusta ..	,,

Woollybutt	Eucalyptus botryoides	Heavy carpentry
Messmate	,, dealbata ...	Underground work
Poplar gum	,, platyphylla	Fencing, etc.
Gulf gum	,, clavigera ...	General purposes
,, ,, ...	,, phœnicea ...	,, ,,
Moreton Bay ash ...	,, tessellaris ...	,, ,,
Bloodwood	,, corymbosa...	Piles, posts, etc.
White bloodwood ...	,, trachyphloia	General purposes
Rough stringy bark...	,, Baileyana ...	Tool handles, leaves oil
Spotted gum	,, maculata ...	Wheels and carriages
Swamp mahogany ...	Tristania suaveolens ...	Piles and ground work
Brisbane box... ...	,, conferta ...	Boats and wheels
Fraser's Island turpentine	Syncarpia Hillii ...	Building, etc.
Russell's mahogany...	Lysicarpus ternifolius	Railway sleepers, etc.
Langdon's hardwood	Backhousia, Bancroftii	General work
Water gum	Eugenia Ventenatti ...	Boat and tool handles
White apple	,, grandis ...	Casks and carpentry
Scrub Cherry... ...	Eugenea myrtifolia ...	Tool handles
,, ,, ...	Panax Murrayi ...	House carpentry
Beech	Gmelina macrophylla	General carpentry
Queensland beech ..	,, Leichhardtii...	Carpentry
Native nutmeg ...	Myristica insipida ...	Carpentry and nuts
Queensland laurel ...	Cryptocarya australis	Carpentry
"Till"	Endiandra Sieberi ...	Tool handles
Cudgerie	Litsea Reticulata ..	House carpentry
Grease nut	Hernandia bivalvis ...	Carriage breaks, etc.
A silky oak	Orites excelsa... ...	General carpentry
A silky oak	Grevillea polystachya	Cabinet and cooperage
Silky oak	,, robusta ...	,,
Beefwood	,, striata ...	,,
Honeysuckle	Banksia integrifolia ...	Cabinet and boats
Milky mangrove ..	Excœcaria Agallocha	General purposes
Scrub poison-tree ..	,, Dallachyana	Axe and pick handles
Swamp oak	Casuarina glauca ...	Shingles and staves
A Swamp oak ...	,, equisetifolia	General purposes
Forest oak	,, torulosa ...	,, ,,
Stringy bark pine ...	Callitris Parlatorei ...	General carpentry
Inland pine	,, robusta ...	Piles, boats, etc.
Native "Brorogery"	,, rhomboidea ...	,, ,,
Sh-pine	Podocarpus elata ...	Boat building, etc.
Kauri pine	Agathis robusta ...	General carpentry
Hoop pine	Araucaria Cunninghamii	,, ,,
Bunya pine	Araucaria Bidwillii ...	,, ,,

For the localities suitable to the growth of the above and other trees well adapted for Cabinet work, &c., I would refer to Mr Souters' voluminus and exhaustive report.

See other Building Materials, page 201.

DOLOMITE.

Dolomite, or Magnesian Limestone, is a first-class building stone, and is found associated with the South Australian freestone; but the great cost of working it with edged tools will prevent its being used except as rubble. If dolomite contains over 5 per cent. of alumina, it makes an excellent hydraulic lime. Collingwood dolomite contains 11 per cent. of alumnia.

GYPSUM.

In nodules and crystals, is found in Yorketown and burnt into Plaster of Paris.

LIMESTONE.

Tertiary is largely distributed over the State in the form of a freestone, very much like the Oamaru freestone of New Zealand. The yellow limestone from Murray bridge contains minute small shells ; is used in building the Educational buildings of Adelaide, and looks like Sydney freestone, 13 c. ft. per ton.

Parrawilla Limestone is extensively found on the southern sea coast ; it is of a salmon tint, and was dressed as a building stone in the Exhibition. Like the Oamaru freestone, it is soft, and is easily cut with a knife.

Manoora, Teatree Gully, etc.—Yield abundance of freestone. Excellent blocks of even quality can be procured up to ten tons weight. This stone has been used for the University in many colours, white and buff, with rough sandstone basements.

Its weight is about 138lbs. per cube foot, or 16¼ feet per ton.

Freestone.—This is another name given to those portions of the above limestones that are suitable for building, the waste stone being used for lime. There are extensive quarries south-east of the colony, at the Hanging Rocks, Mount Gambier district, &c. Mr. Pitman, of Adelaide, says there are strata covering hundreds of square miles, in places 90 feet thick. It has been well tested at Port MacDonnell, and similar stone has been used for the Post-offices, Museum, and other buildings at Adelaide, &c. At the Gawler Plains it is found in nodules, and in this form is only fit for lime. There can be little doubt as to its identity with the Oamaru stone, which for the last seven years has been the favourite freestone for public buildings in Melbourne. It extends from the Gawler Plains to Mount Gambier, used in the construction of the Mount Gambier Hospital, in conjunction with a salmon-tinted dolomite, or magnesian limestone, which costs about three times as much to work as the freestone, and was therefore used as rubble (or hammer-dressed stone) to reduce the cost of construction.

Marble.—From Rapid Bay, first-class.

Kapunda Marble was used for facing the new Parliament Houses at Adelaide.

White Marble, from Macclesfield, Angaston, &c., formed part of the structure called the Building Museum, Melbourne. The great cost of working this and other marbles would preclude them coming into general use, except for ashlaring cemeteries, monuments, mantels, slabs, &c.

Slate.—Good roofing slates are obtained at the Willunga quarries. and **Slate slabs** at Mintaro. *See* page 201.

CEMENT.

Maria Island Cement.—In April, 1890, it was discovered that the cliffs of this island could be utilized for the manufacture of a superior Portland Cement. The **natural cement stone** forming the cliffs was analysed, and soon after a sample of the cement made from the stone was also analysed and afterwards tested as to its practical strength. The cliffs are from 200 to 1500 feet in height, and are well situated for the economical manufacture of the cement, having good anchorage, pier, and depth of water for the largest intercolonial vessels within half a mile of the works. Professor Kernot tested the cement which was finely ground, leaving a residue in a sieve of 2,500 meshes per square inch, of only 1 per cent. Its weight is from 104 to 125lbs. per bushel, in proportion to its looseness.

Three briquettes of pure cement were tested after 7 days' setting and gave an average tenacity of 402lbs. per square inch, while two others tested after 14 days gave an average of 470lbs. per square inch.

Bricks.—Fire-clay, Pottery-clay, Fire-bricks, Paving Tiles, and Terra Cotta, etc., can be obtained from the coal measures, as at Seymour, &c. *See* geological map.

Freestone (Sandstone).—Good building, from Teatree Quarry, 21 miles from Hobart; also from Lindisfern and Mona Vale; all being similar to the Point Bentenet and Spring Bay sandstone, used in Melbourne for years. Freestone from Knocklofty is of a brown tinge.

Granite is found on the north-east coast of Tasmania.

Limestone and **Marble** is found near Beaconsfield, the River Tamar, and near New Norfolk.

A large portion of the lime made near Hobart and the Don River is more or less **hydraulic**, and well adapted for concrete. As it is liable to fire when slacking, it cannot be exported as quick or fresh lime.

Blackwood, one of the finest cabinet-woods in Tasmania, now extensively exported and used in other States for superior joinery; also used for wheels, casks, carriages, and railway trucks; colour of a light walnut; maximum height, 130 feet, and diam. 4 to 6 feet.

Blue Gum (*Eucalyptus globulus*), so called by Labillardiere, who discovered it in Tasmania, in 1792; although found in N.S. Wales and Victoria, it is commonly known as the blue gum tree of Tasmania. The leaves when young are of a bluish green and nearly round they afterwards become long and narrow, of a sea-green colour, and very fragrant, producing small white fragrant flowers. The wood when mature is hard, dense, and durable.

Eucalyptus piperita is another description of blue gum largely used for ship-building.

Celery Top Pine grows as large as the Myrtle. It is straight-grained, and makes good flooring boards, as it does not shrink much.

He Oak, or Swamp Oak.—Coarse-grained, light, and tough, and beautifully marked for furniture making.

Huon Pine, like bird's-eye maple, used for panels of doors, &c., and for cabinet work. It is found at Port Macquarie, Port Davy, Pieman River, and on the western coast generally.

King William, or Forth Pine, up to 12ft. girt, is found at the head of the Forth River.

Myrtle, or Tasmanian Beech.—Colour, yellowish pink, highly ornamental cabinet wood ; maximum height, 200 feet, and diam., 12 feet. It is used for flooring boards, carpentry, and is said to resist the *cobra*.

Peppermint (*Eucalyptus amygdalina*).—This is a superior wood for piles, and is said to resist the attacks of the cobra.

Red or Pencil Pine, from near the source of the River Forth.

NEW ZEALAND BUILDING MATERIALS.

Oamaru Free Limestone.—This excellent stone was thus referred to by W. Blair, Chief Engineer of Public Works, at Otago :—The Oamaru Stone is a white granular limestone. According to the Government Analyst, its chemical constituents are as follow :—Carbonate of lime, 90.15 ; Alumina, 1.55 ; Oxide of iron, .55 ; Soluble silica, .45 ; Insoluble matter, 7.15 ; Loss, .15 = 100.00. This places it in the same class as the *Oblites of England and Caen stone of France*. It has a remarkable uniformity of colour and texture, and can be obtained in large blocks. Like all limestones of this kind, it is quite soft when quarried, but hardens rapidly on exposure to a dry atmosphere. This enables it to be worked into most elaborate ornamentation at little cost.

The durability of the Oamaru stone, its resistance to the disintegrating action of sulphate of soda is comparatively feeble.

The Bank of Australasia and Imperial Insurance Offices, in Melbourne, are built with this stone ; also ornamented stone steeple and church, Bondi, Sydney, 1880 to 1914.

Trachyte is a fine grey stone, found at Port Chalmers, and used in the construction of the Graving Dock there, and for street kerbing of Dunedin and Port Chalmers. It is said not to cost so much as Bluestone to work. The Trachyte of New South Wales *costs more* to work than Bluestone. The two Trachytes mentioned are similar in colour, viz., a light bluish grey. It resists the action of fire, and is used for building lime-kilns in Otago.

Kauri (*Dammara Australis*) (Lambert).—The Kauri is the finest forest tree in New Zealand, and attains a height of 120 to 160 feet. The trunk is sometimes 80 to 100 feet high before branching, and attains a diameter at the base of 10 to 20 feet, but is now getting scarce.

The variety known as Mottled Kauri is largely used for panelling.

Kauri pine is stronger as a beam than any other known pine, but unlike them it shrinks lengthwise when unseasoned. It occurs only in the North Island, and north of Mercury Bay, and grows best near the sea, on wet clay land.

The turpentine of this tree forms the celebrated Kauri gum, which is extensively excavated from the sides of old forests as far south as Taranaki. Kauri was used in the construction of the Queen's Wharf, Auckland, and after 23 years, the sea-worms had eaten only the sap-wood of the young timber.

Kauri pine has been proved one of the best soft wood timbers of the world, being harder than Baltic deal, and entirely free from knots.

USEFUL TABLES AND MEMORANDA.

LIFTING A STONE BUILDING.

As an example of what can be done in the direction of **underpinning**, the alteration recently made to a two-storey **masonry structure** in Illinois (says the London *Builder*) is decidedly worthy of attention.

The building, used as a county courthouse, covers an area of nearly 10,000 square feet, the walls are about 60ft. high, and the roof is surmounted by a heavy dome. For the purpose of forming a new lower story, the entire structure was raised bodily by more than 12ft.

The mode of operation seems to have been particularly simple, and was as follows :—

Rectangular holes at short intervals were cut through all the outer and two cross walls, about 3ft. above the ground level.

Two or three 15in. steel I-beams were then inserted in each hole, the ends being supported on 12in. square timbers parallel with the walls.

The timbers in turn were set on 10-ton screw-jacks resting upon two 12in. square sills.

By the aid of a large gang of men the jacks were screwed up gradually until the whole building had been lifted 6in., when the load was transferred to timber beams placed on each side of the walls, these beams being shored up whilst cribwork was built beneath the jacks so that the next lift might be made.

When the structure had been raised 2ft. the old foundations were taken away, and a third crib was added and continuously built up as the work progressed.

Finally the centre crib was removed, and in its place new foundatons were formed, and new walls were carried up to the old work.

Each front of the building includes a massive portico, having four stone columns, each weighing about 50 tons. These porticos were raised together with the main walls by using longer steel beams at the necessary points. It is said that the work was successfully accomplished without cracking the masonry or causing any other structural injury.

REMOVING RUST FROM IRON.

May easily be effected by immersing the article in a nearly saturated solution of chloride of tin, even if much eaten into. The duration of the immersion will depend upon the thicker or thinner film of rust; in most cases, however, 12 to 24 hours will suffice. The solution of chloride of tin must not contain too great an excess of acid, otherwise it will attack the iron itself. After the articles have been removed from the bath, they should first be washed in water, and then with ammonia, and be dried as quickly as possible. Articles treated in this manner assume the appearance af dead silver.

TO DESTROY OR CONSUME TREE STUMPS.

Bore a hole with a 2in. Auger into the stump from the top. Pour a pint of mixture of nitric acid and sulphuric acid, equal parts, and close the hole with a waxed plug. A stump, roots and all, thus treated will be rotten in 30 days.

Another Method.—At the end of summer, into a 1in. bored hole, put 2-oz. of saltpetre, fill with 18in. of water and plug tight. In three months fill hole with kerosene. When lighted the stump and roots will smoulder away.

NUMBER OF TREES TO THE ACRE.

4 feet	apart	2720	10 feet	apart	430	20 feet	apart	110
5	,,	1749	12	,,	325	22	,,	70
6	,,	1200	15	,,	200	80	,,	50
8	,,	689	18	,,	135			

To Test Soundness of Timber.—Place the ear close to one end of the timber while attendant strikes the other end with a hammer. If the sound is ringing and clear, the log is good, but if dull there is some flaw or unsound spot.

Prevent Lead from spluttering in leading iron palisading into stone.—Drop oil into hole or mould.

To test Iron or Steel.—A drop of nitric acid turns iron white and steel black.

Flux for Soldering Zinc.—Dissolve small pieces of zinc in muriatic acid, with water, double quantity.

To toughen Plaster Casts and prevent cracking, saturate them in hot glue and water—1 to 5.

Never use Tarred Paper under a tin roof. The acid in the tar destroys the metal.

Place thick paper under tin to prevent damage when laid on concrete.

To hang a door that will rise as it opens and also shut itself unaided, use a wider butt hinge at bottom than top of door.

To **Underpin Super-structure of Building** for Insertion of Rolled Steel Joists or Girders.—Above the proposed girder position make holes through wall at most solid portions, such as between windows or openings above, sufficient only to insert cross girders, of steel preferred. Support these each on timber or steel uprights, leaving sufficient room for insertion and working of proposed girders between the rows of uprights. Raise uprights to required height by "fox-tail" wedges inserted at bottom, and staying uprights if necessary. When the weight is taken, carefully remove the building material, of stone or brick.

Place your bearer in position with ends secured, then build in with cement and iron wedges driven above girder till the whole length is solidly resting on girder, and properly set and dry; then remove under-pinning timbers and cross girders, the holes being built up solid.

Simple method of **framing** for concrete **kerbs** and **gutters** is with 9in. x 3in Oregon on each side of kerbs, the gutters being made after the 9in. x 3in. being placed on its flat for boundary and levels.

Concrete bressemers over openings are made by upright supports, one each side of wall, with cross-pieces nailed underneath, allowing for thickness of planking, at sides and bed. The planks are easily released when concrete is dry by simply knocking loose the cross-pieces.

MEASUREMENTS AND WEIGHTS OF COINS.

A bronze halfpenny measures exactly 1 inch in diameter—5 equal 1oz.
1 bronze penny measures exactly 1.2 inch in diameter ,, ,
A florin and a sixpence weigh ½ an ounce.

Term penny as applied to nails—
Three penny means 3 pounds to 1000 nails.
Eight penny means 8 pounds to 1000 nails.

The diameter of a circle multiplied by .8862 equals side of equal square in area.

The diameter of a circle multiplied by .7071 equals diameter inscribed square in circle.

The side of a square multiplied by 3.545 equals circumference of a circle of equal area.

The circumference of a circle multiplied by .2821 equals side of a square of equal area.

The diameter of a cirle divided by 3.1416 equals circumference.

HINTS ON RECKONING.

Given the price per ton to find value of more or less weight.
Reckon the tons as pounds, cwts. as shillings, each quarter as 3d., and 9lbs. as 1d.

MENSURATION OF SURFACES AND VOLUMES.

Area of rectangle = length x breadth.
Area of triangle = base x half perpendicular height.
Diameter of circle = radius x 2 = circumference x 0.31831.
Circumference of circle = diameter x 3.1416.
Area of circle = square of diameter x 7854.
Area in sector of circle =

$$\text{area of circle} \times \frac{\text{number of degrees in arc}}{360}$$

Area of surface of cylinder = circumference x length plus area of two ends.

To find diameter of circle having given area: Divide the area by 7854 and extract the square root.

To find the volume of a cylinder: Multiply the area of the section in square inches by the length in inches = the volume in cubic inches. Cubic inches divided by 1728 = volume in cubic feet.

Surface of a sphere = square of diamater x 3.1416.
Volume of a sphere = cube of diameter x .5236.
Side of an inscribed cube = radius of a sphere x 1.1547.

Area of the base of a pyramid or cone, whether round, square, or triangular, multiplied by one-third of its height = the volume.

To find area of a circle multiply square of diameter by .7854.
To find diameter of a circle multiply circumference by .31831.
To find circumference of a circle multiply diameter by 3.1416.

BRITISH WEIGHTS AND MEASURES.

Lineal Measure.

7.92 inches	=	1 link.
12 inches	=	1 foot.
3 feet	=	1 yard.
6 feet	=	1 fathom.
5½ yards	=	1 rod, pole, or perch.
100 links	=	66 feet = 1 chain.
220 yards	=	40 poles = 10 chains = 1 furlong.
8 furlongs	=	80 chains = 1,760 yards = 5,280 feet = 1 mile.
6,080 feet	=	1 Admiralty knot.

Square Measure.

144 square inches	=	1 square foot.
9 square feet	=	1 square yard.
30¼ square yards	=	1 square, pole, rod, or perch.
40 square poles	=	1 rood.
4 roods	=	4,840 square yards = 1 acre
640 acres	=	1 square mile.

Liquid Measure.

8.665 cubic inches	=	1 gill.
4 gills	=	1 pint.
2 pints	=	1 quart.
4 quarts	=	1 gallon.
1 gallon	=	277¼ cubic inches or 0.16 cubic foot
1 ,,	=	10lbs. of distilled water.
1 cubic foot	=	6.232 gallons.
1 cwt. water	=	1.8 cubic foot.
1 bushel	=	1.28 ,,

Avoirdupois Weight.

27 ·344 grains	=	1 drachm.
16 drachms	=	437½ grains = 1 ounce.
16 ounces	=	7,000 grains = 1 pound.
14 pounds	=	1 stone.
28 pounds	=	1 quarter.
4 quarters	=	112 pounds = 1 hundredweight.
20 hundredweight	=	2,240 pounds = 1 ton.

Troy Weight.

24 grains	=	1 pennyweight.
20 pennyweights	=	480 grains = 1 troy ounce.
12 troy ounces	=	5,760 grains = 1 troy pound.

Measures and their Square Dimensions.

	in.	in.	in.		in.	in.	in.
1 pint =	4	x 4	x 2-1/10	31½ gals—1 barrel			
1 quart =	4	x 4	x 3-9/16		24	x 24	x 14.7
1 gallon =	7	x 4	8½	½-bushel =	12	x 11.2	x 8.
10 gals. =	14	x 15	x 11.	1 bushel =	12	x 11.2	x 16.
5 bushels =	24	x 28	x 16				

Metres and Feet.

1 metre = 3ft 3.3704in. 1 foot = .304 metres.

THE HANDY READY RECKONER.

No.	1¼d.	1½d.	1¾d.	2d.	2¼d.	2½d.	2¾d.	3d.	3¼d.	3½d.	3¾d.	4d.	4¼d.	4½d.	4¾d.	5d.	5¼d.	5½d.	5¾d.
Art.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1	0 1¼	0 1½	0 1¾	0 2	0 2¼	0 2½	0 2¾	0 3	0 3¼	0 3½	0 3¾	0 4	0 4¼	0 4½	0 4¾	5	0 5¼	0 5½	0 5¾
2	0 2½	0 3	0 3½	0 4	0 4½	0 5	0 5½	0 6	0 6½	0 7	0 7½	0 8	0 8½	0 9	0 9½	0 10	0 10½	0 11	0 11½
3	0 3¾	0 4½	0 5¼	0 6	0 6¾	0 7½	0 8¼	0 9	0 9¾	0 10½	0 11¼	1 0	0 8¾	1 1½	1 2¼	1 3	1 3¾	1 4½	1 5¼
4	0 5	0 6	0 7	0 8	0 9	0 10	0 11	1 0	1 1	1 2	1 3	1 4	1 5	1 6	1 7	1 8	1 9	1 10	1 11
5	0 6¼	0 7½	0 8¾	0 10	0 11¼	1 0½	1 1¾	1 3	1 4¼	1 5½	1 6¾	1 8	1 9¼	1 10½	1 11¾	2 1	2 2¼	2 3½	2 4¾
6	0 7½	0 9	0 10½	1 0	1 1½	1 3	1 4½	1 6	1 7½	1 9	1 10½	2 0	2 1½	2 3	2 4½	2 6	2 7½	2 9	2 10½
7	0 8¾	0 10½	1 0¼	1 2	1 3¾	1 5½	1 7¼	1 9	1 10¾	2 0½	2 2¼	2 4	2 5¾	2 7½	2 9¼	2 11	3 0¾	3 2½	3 4¼
8	0 10	1 0	1 1	1 4	1 6	1 8	1 10	2 0	2 2	2 4	2 6	2 8	2 10	3 0	3 2	3 4	3 6	3 8	3 10
9	0 11¼	1 1½	1 3¾	1 6	1 8¼	1 10½	2 0¾	2 3	2 5¼	2 7½	2 9¾	3 0	3 2¼	3 4½	3 6¾	3 9	3 11¼	4 1½	4 3¾
10	1 0½	1 3	1 5½	1 8	1 10½	2 1	2 3½	2 6	2 8½	2 11	3 1½	3 4	3 6½	3 9	3 11½	4 2	4 4½	4 7	4 9½
11	1 1¾	1 4½	1 7¼	1 10	2 0¾	2 3½	2 6¼	2 9	2 11¾	3 2½	3 5¼	3 8	3 10¾	4 1½	4 4¼	4 7	4 9¾	5 0½	5 3¼
12	1 3	1 6	1 9	2 0	2 3	2 6	2 9	3 0	3 3	3 6	3 9	4 0	4 3	4 6	4 9	5 0	5 3	5 6	5 9
13	1 4¼	1 7½	1 10¾	2 2	2 5¼	2 8½	2 11¾	3 3	3 6¼	3 9½	4 0¾	4 4	4 7¼	4 10½	5 1¾	5 5	5 8¼	5 11½	6 2¾
14	1 5½	1 9	2 0½	2 4	2 7½	2 11	3 2½	3 6	3 9¼	4 1	4 4¾	4 8	4 11½	5 3	5 6½	5 10	6 1½	6 5	6 8½
15	1 6¾	1 10½	2 2¼	2 6	2 9¾	3 1½	3 5¼	3 9	4 0¾	4 4½	4 8¼	5 0	5 3¾	5 7½	5 11¼	6 3	6 6¾	6 10½	7 2¼
16	1 8	2 0	2 4	2 8	3 0	3 4	3 8	4 0	4 4	4 8	5 0	5 4	5 8	6 0	6 4	6 8	7 0	7 4	7 8
17	1 9¼	2 1½	2 5¾	2 10	3 2¼	3 6½	3 10¾	4 3	4 7¼	4 11½	5 3¾	5 8	6 0¼	6 4½	6 8¾	7 1	7 5¼	7 9½	8 1¾
18	1 10½	2 3	2 7½	3 0	3 4½	3 9	4 1½	4 6	4 10½	5 3	5 7½	6 0	6 4½	6 9	7 1½	7 6	7 10½	8 3	8 7½
19	1 11¾	2 4½	2 9¼	3 2	3 6¾	3 11¼	4 4¼	4 9	5 1¾	5 6½	5 11¼	6 4	6 8¾	7 1½	7 6¼	7 11	8 3¾	8 8½	9 1¼
20	2 1	2 6	2 11	3 4	3 9	4 2	4 7	5 0	5 5	5 10	6 3	6 8	7 1	7 6	7 11	8 4	8 9	9 2	9 7
21	2 2¼	2 7½	3 0¾	3 6	3 11¼	4 4½	4 9¾	5 3	5 8¼	6 1½	6 6¾	7 0	7 5¼	7 10½	8 3¾	8 9	9 2¼	9 7½	10 0¾
22	2 3½	2 9	3 2½	3 8	3 1¾	4 7	5 0½	5 6	5 11½	6 5	6 10½	7 4	7 9½	8 3	8 8½	9 2	9 7½	10 1	10 6½
23	2 4¾	2 10½	3 4¼	3 10	3 4¾	4 9½	5 3¼	5 9	6 2¾	6 8½	7 2¼	7 8	8 1¾	8 7½	9 1¼	9 7	10 0¾	10 6½	11 0
24	2 6	3 0	3 6	4 0	4 6	5 0	5 6	6 0	6 6	7 0	7 6	8 0	8 6	9 0	9 6	10 0	10 6	11 0	11 6
25	2 7¼	3 1½	3 7¾	4 2	4 8¼	5 2½	5 8¾	6 3	6 9¼	7 3½	7 9¾	8 4	8 10¼	9 4½	9 10¾	10 5	10 11¼	11 5½	11 11¾

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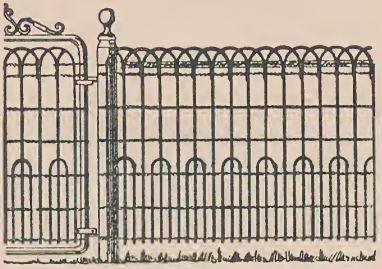

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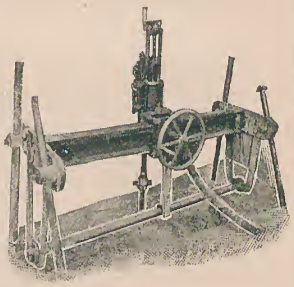

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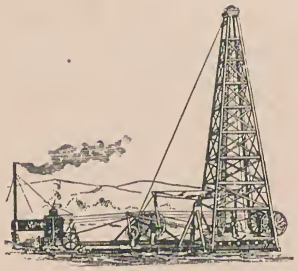

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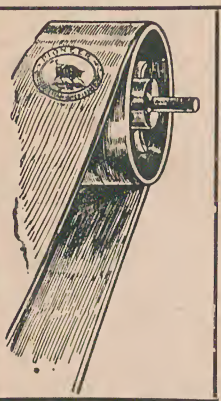

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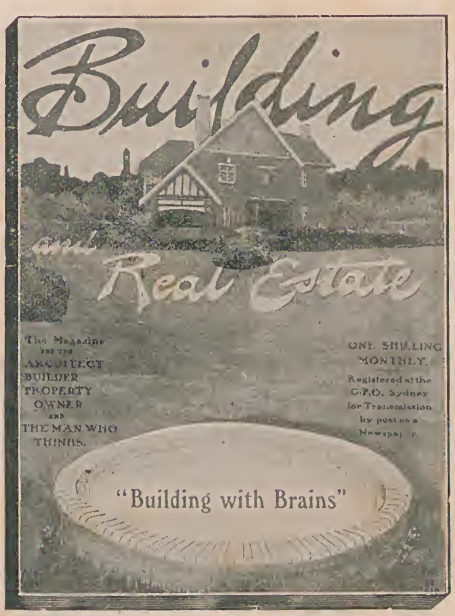

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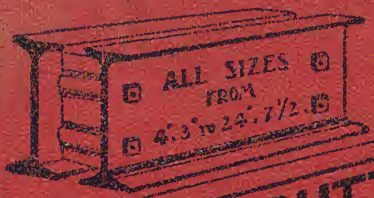

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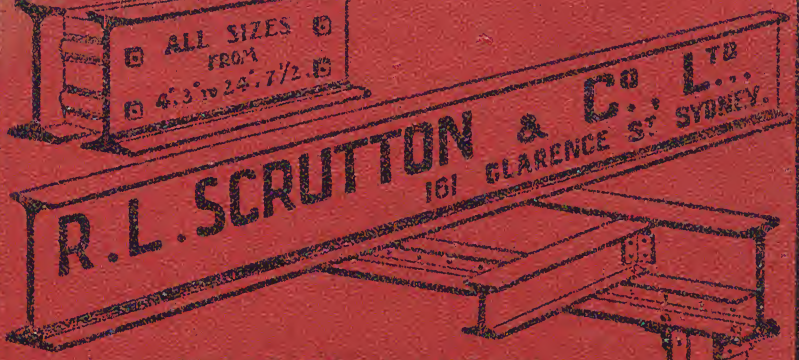

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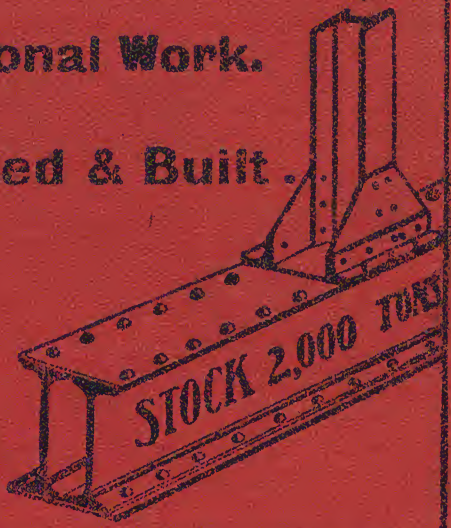

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AND
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